Amateur Radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

VOL 54, No 9, SEPTEMBER 1986

AMATEUR RADIO ENGINEERING PROJECT — 10 MHz frequency counter
ALARA CONTEST — 1986 rules
ANTENNA LENGTH CHART — ready reckoner
ANTENNA ARRAYS — part 2
Construct a **TESTER** for coil inductance
TECHNICAL MAILBOX — new column
EMC REPORT — returns
ALARA CONTEST — 1986 rules

The Australian Electronics Monthly

We are proud to announce that we have obtained the rights to publish a substantial part, of our choosing, from the monthly issues of the UK edition of *ELEKTOR ELECTRONICS* within each issue of Australian Electronics Monthly.

This means that, each month we'll be adding around 30 pages (often more) of projects, technical articles and features especially culled from the pages of one of the world's most widely read and respected electronics publications. And you'll get to see the latest material from Europe within weeks of it going on-sale there and months ahead of when it normally appears here!

Projects will be specially chosen and local parts supply sought prior to publication. Printed circuit boards will be available through our PC Board Service and, with the co-operation of retailers, at selected retail outlets. We confidently expect many of the Elektor projects to be available from local suppliers in kit form.

The Australian Electronics Monthly you have come to know and love will continue 'as usual' — the features, technical articles, projects and news. Elektor is planned to be incorporated as an additional section.

What a tremendous BONUS!

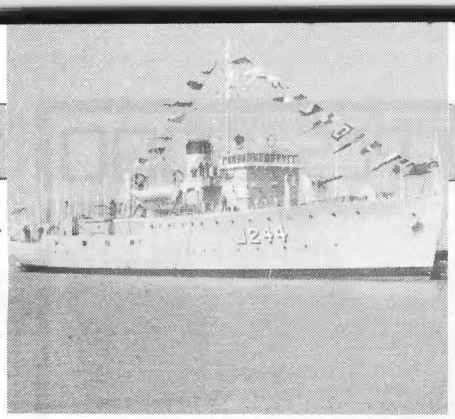
- More projects!
- More features!
- More articles!
- More data!

Every month — commencing with October's issue.

And that's not all! While we're importing material from one side of the globe, we're exporting it to the other! We have also recently concluded an agreement with the US magazine RADIO-ELECTRONICS to exchange editorial material. It seems US hobbyists are particularly enthusiastic about Australian electronics projects and we expect to export more material to Radio-Electronics than vice versa. Whenever topical and relevant features appear in Radio-Electronics, we'll move swiftly to bring them to you in the pages of Australian Electronics Monthly.

Australian Electronics Monthly — bringing you the best, from around Australia and around the world.

Australian Electronics Monthly is edited by Roger Harrison VK2ZTB and published by Kedhorn Holdings, Fox Valley Centre, Cnr Fox Valley Rd & Kiogle St, Wahroonga 2076 NSW.



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HMAS *Castlemaine*, a historic Naval Ship, Maritime Museum and Amateur Radio Station, docked at Gem Pier, Williamstown, Victoria and preserved by the Maritime Trust of Australia.

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Amateur Radio

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Each year, the WIA Publications Committee selects several awards, one of these awards being the Al Shawsmith Journalistic Award. As the name suggests, this award if presented for the best article published in *Amateur Radio* from a journalistic point of view. There have been some doubts expressed recently whether the award is well enough known, and as a result, the Editor, in collaboration with Alan VK4SS, has written a brief history (see page 5), of the award and how you, the readers of AR, may make yourself eligible to join the dignified list of recipients.

Amateur Radio is always in need of a steady supply of articles for publication, whether they be short technical tips or long technical articles; even interesting anecdotes. Whilst articles on advanced and new techniques are needed, it must not be forgotten that new amateurs and novices are always interested in good basic items which the "seasoned amateur" may class as too basic for AR. So, write-up that project that has worked for you, as *Amateur Radio* has an enormous appetite for a well-balanced and varied diet.

Preparing an article for *Amateur Radio* is very simple. Just commit your thoughts to paper as you would when explaining to a friend over the air. Manuscripts may be clearly hand-written or typed original copies (no photocopies please, as frequently the photocopier prints a blank in a crucial portion of a technical explanation or formula). Include circuit diagrams if applicable — they do not have to be ready for publication (clear sketches are adequate), as AR's draughts-people will redraw them. Don't overlook a photograph too, but be careful when writing captions on the back — many good photos have been damaged by heavy ball-point pen marks coming through or felt-tip pens smudging from the back of one photo to the front of another.

The Technical Editors are pleased to introduce a new regular column, titled *Technical Mailbox*. The column will endeavour to answer readers queries relating to amateur radio, and the first set of replies may be found on page 51. All readers are welcome to make use of this column.

Gil VK3CGG, has written an interesting article on electronic keyers in very basic, layman's terms, see page 40. Gil is a relative newcomer to CW and his enthusiasm for the mode is contagious.

Drew VK3XU, says Direct Conversion Receivers are here to stay and gives an insight into the principles of operation of such receivers on page 34. Next month, Drew will include full diagrams and instructions for constructors to make their own DC receiver for 80 metres. (B-KP)

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publisher.

DEADLINE

All copy for inclusion in the November 1986 issue of Amateur Radio, including regular columns and Hamads, must arrive at PO Box 300, Caulfield South, Vic. 3162, at the latest, by 9am, 22nd September 1986.

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Material should be sent direct to **PO Box 300, Caulfield South, Vic. 3162,** *by the 20th day of the second month preceding publication.* **Note:** *Some months are a few days earlier due to the way the days fall. Watch the space below the index for deadline dates.* **Phone: (03) 528 5962.**

HAMADS should be sent direct to the same address, by the same date.

Acknowledgment may not be made unless specifically requested. All important items should be sent by Certified Mail. The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying a reason.

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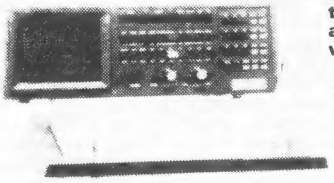

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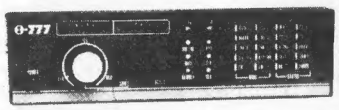

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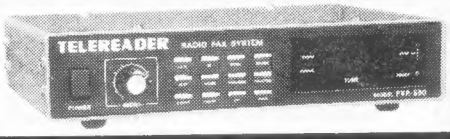

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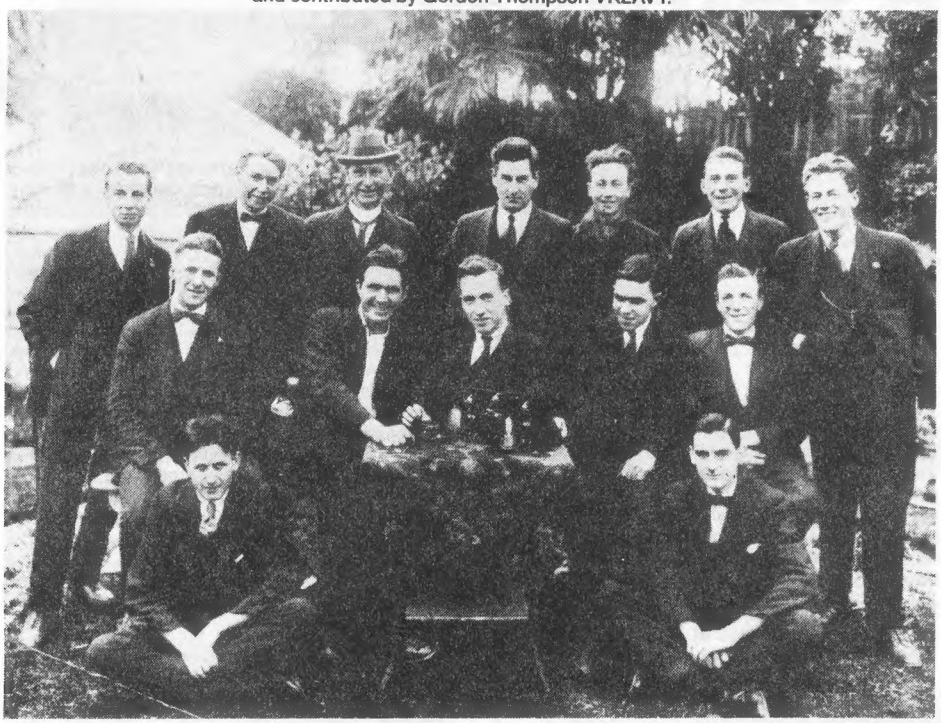
Waverley Amateur Radio Society

The accompanying photographs were taken at the Waverley Amateur Radio Society around 1920 and contributed by Gordon Thompson VK2AVT.

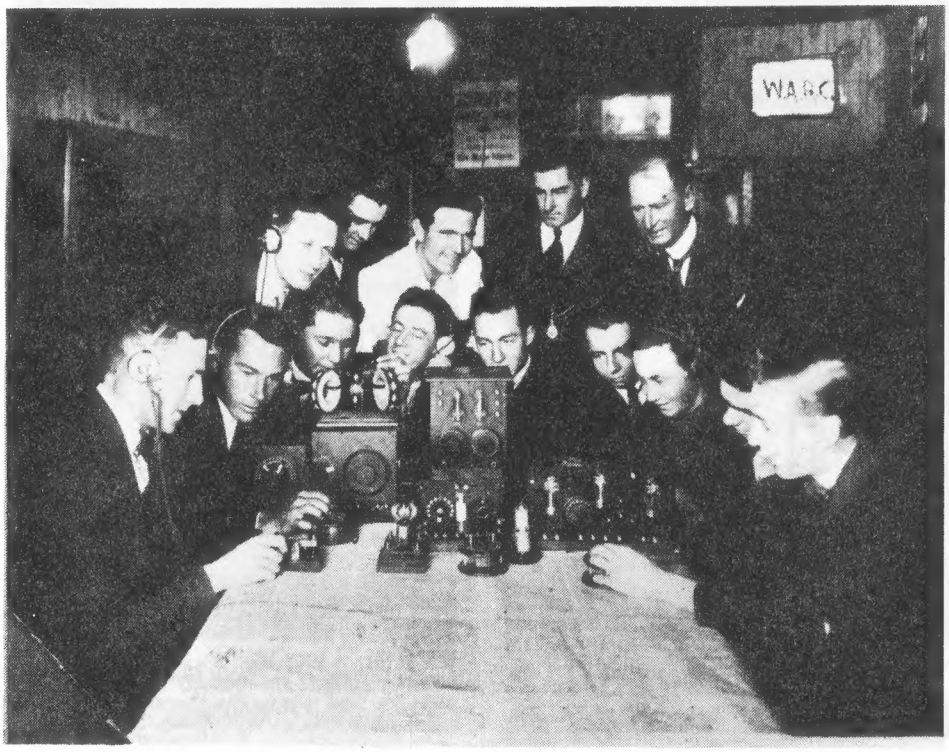


Above

Back row from left: Eric Lavington; Maurice Anderson; F Geddes Snr; Bill Holsgrove; Jack Gordon; Frank Harvey; unknown.
Front row: Neville Ruby; Dan Williams; Allan Burrows; Gordon Thomson; unknown.
Seated: Bill Lawrence; unknown.

Below

Back row from left: Bill Lawrence; unknown; Dan Williams; Les Holsgrove; Frank Geddes Snr.
Front row: Neville Ruby; Frank Harvey; Maurice Anderson; unknown; Allan Burrows; Eric Lavington; Jack Gordon; Gordon Thompson; unknown.



Editor's Comment

A FEATURE BEGINS, ANOTHER RETURNS

At our Publication Committee meeting for July the idea was proposed by one of the Technical Editors that a regular monthly feature be introduced under the title of "Technical Mailbox." We are happy to present the resulting first instalment this month.

Initially, we are providing answers to a backlog of questions which have surfaced from time to time, but we hope that soon you, our readers, will send in to us your questions on various technical topics. Replies will be published on the "Technical Mailbox" page more or less in the sequence in which the questions are received. Of course, some problems may require more research than others to enable adequate answers to be prepared, so these may be delayed a little longer.

As you will see when you read the first instalment a humorous approach has been adopted, but this by no means implies any lack of serious technical "know-how". Many facts are impressed more firmly on our memories when accompanied by a little humour.

One restriction will apply to the subjects to be covered. We would prefer not to become involved with "nuts and bolts" type fault-fixing of specific commercial equipment; but problems of a general kind which may be encountered with any make or model will be addressed. Subject to this limitation, don't hesitate to write in to "Technical Mailbox" and try out our experts!

Re-commencing this month, we once again feature an EMC Column. Hans VK2AOU, is an acknowledged international expert on the subject, and is in a unique position to give us the benefit of the latest developments in this area from West Germany. In that country, technical and legislative measures to promote compatibility are possibly more advanced than anywhere else in the world. It is likely that some of your "Technical Mailbox" problems may involve interference. If so, we can probably advise in this area also, perhaps with help from Hans if the Technical Editors find their expertise is overtaxed.

In all cases, please don't expect miracles to occur overnight! Our unavoidable six-week lead time, plus necessary time to research the problem itself, implies at least a two-month delay between receiving your inquiry and seeing the answer in print. But give us a try! We look forward eagerly to seeing your first batch of problems on our desks!

Bill Rice VK3ABP
Editor
ar

THOUGHT FOR THE MONTH

A change in attitude is always an option.

HMAS CASTLEMAINE

The *CASTLEMAINE AWARD* has been created to celebrate the 75th Anniversary of the *Royal Australian Navy* and the 45th Anniversary of the launching of the HMAS *Castlemaine.*

The *Royal Naval Amateur Radio Society* (RNARS) was founded in the United Kingdom in October 1960, with the purpose of gathering together all radio amateurs who had any connection with the Navy or its allied services.

Headquarters of the Society is situated at the Royal Naval Signal School, HMAS *Mercury,* in Hampshire, UK. Since its formation, membership has been extended to members of the Merchant Navy, including associates in foreign Navies and Merchant Service. There are now over 3000 members world-wide.

Upon joining the Society, members are issued with an official RNARS number from Headquarters.

The flagship of the RNARS is the HMS *Belfast* which is now a floating museum, permanently moored on the River Thames between Tower Bridge and London Bridge.

Flagship of the Australian Branch of RNARS is the HMAS *Castlemaine,* which is owned by the Maritime Trust of Australia. *Castlemaine is moored at Gem Pier, Williamstown, Victoria, and has a museum on-board where visitors can inspect a fascinating collection of relics and pictures relating to Australia's maritime heritage.*

The RNARS is associated with the ship and have been responsible for restoring the Wireless Office from which an amateur radio station, VK3RAN, is operated.

RNARS members take part in JOTA each year, and encourage Sea Scouts and Guides to foster relationships with their counterparts throughout Australia and overseas.

As a special effort so that amateurs world-wide can attain the Castlemaine Award, Victorian members of RNARS are on air as frequently as possible during 1986, the 75th Anniversary of the Australian Navy. The call sign is operational on weekends and public holidays, and there are special SSB and CW nets on Mondays and Tuesdays. Net frequencies are:

3.613 MHz — Mondays at 1030 UTC
3.527 MHz — Tuesdays at 1030 UTC
7.090 MHz — Sundays at 0300 UTC

(The RNARS is also associated with HMAS *Diamantina* which became operational as VK4RAN this year).

HMAS *Castlemaine,* a Bathurst class corvette/minesweeper, was built at Williamstown, Victoria, and commissioned in 1942. She served with distinction in the northern waters during WWII doing some 117 000 miles on war service.

Following her commission she was engaged escorting convoys between Melbourne and Sydney, and later Townsville to Port Moresby.

In early November 1942, she sailed for Betano (Timor) to embark soldiers and refugees under cover of darkness. Later the same month while in company with HMAS *Armidale,* both ships were attacked but escaped unharmed.

In July 1943, after 327 days of almost unbroken sea service *Castlemaine* was refitted in Sydney. She then recommenced escort work in late August. She was kept busy escorting vessels and carrying troops, stores and mails until mid-1944 when she was re-fitted at Adelaide.

She was then kept busy operating with a survey unit until she was despatched from Darwin on August 16, 1945 to Morotai, Subic Bay (Philippines). She arrived at Hong Kong on the 29th, where patrol work and mine clearance was carried out with the 21st and 22nd minesweeping flotillas.

HMAS *Castlemaine* returned to Melbourne on December 16, 1945.

She served as an immobilised training ship at HMAS *Cerberus* during the 1950s and 60s and was towed back to Melbourne for restoration as a museum ship in June 1974.

Any readers who feel they may qualify to become members of the Society are welcome to contact any members of the RNARS on air or direct to the Australian Branch Manager, Frank Welsh VK3BPV, 13 Central Avenue, Mooroolbark, Vic. 3138, or the Group Manager, Margaret Nally VK3QU, Box 144, Elwood, Vic. 3124.

See also page 51, *Amateur Radio* July 1986, for details of the *Castlemaine Award*

ar

Bill Tresize VK5RA, an original crew member of HMAS *Castlemaine,* photographed recently in his shack. Bill served aboard *Castlemaine* throughout WWII.

Margaret VK3QU, ex-WRANS, was L/Telegraphist on HMAS *Harman* from 1951-55. She is now the *Castlemaine* Group Manager.

HISTORY OF THE AL SHAWSMITH JOURNALISTIC AWARD

Every year the Publications Committee selects from the articles published that year three authors who are considered to merit awards for the quality of their work. We have mentioned previously the Higginbotham Award (for meritorious service towards amateur radio), and the Technical Award (for the best technical article or articles). The third is the Al Shawsmith Journalistic Award, the title of which is very nearly self- explanatory.

Recently, however, its founder (Alan Shawsmith VK4SS, who is official historian to the Queensland Division) expressed doubt about whether the Award was well-enough known. We agreed with him that although it was still serving a very useful purpose perhaps some more publicity would encourage more writers to contribute generally-interesting articles to AR, so Al has now sent us this account of the Award's origin.

"The idea of ASJA was born after an unexpected visit by a most interesting Old Timer to the shack. On his departure I cogitated that almost all the amateurs I had met over the years had at least one interesting story to tell — be it in human relations, DXpeditioning, adventure, or electronics generally. How was it that so little of this material ever found its way to an Editor's desk?

"In an effort to entice more to put pen to paper, the ASJA was created. Of course no one can know if it has had any catalytic effect on the number of articles or stories subsequently sent to AR magazine, however, from the feedback to hand, it seems to have been well received. Consequently, I'm most happy to continue the award.

"Not everyone has the ability to commit their thoughts to paper in a rational manner. This is an art form in itself. If you have anything that you feel is of sufficient reader interest on any of the above topics, submit it to the Editor yourself or enlist the help of another to do so. This is the only criterion required."

To round off the story, and perhaps to show those with a few years' files of AR what sort of articles have won the Award, here is a list of winners since its inception;

1973 Syd Molen VK2SG "Las Balsas"
1974 Don Marshall VK4ZAF "Brisbane Valley Flood Disaster"
1975 Bill Rice VK3ABP "On Eyre"
1976 B J Morgan VK7RR "A Repeater for Southern Tasmania"
1977 Max Dawkins VK3TR "Some Field Station"
1978 Peter Arriens VK1PA "The Solo Voyage"
1979 Terry Clark VK2ALG "The Living Legend"
1980 Eddy Rooms VK4AER "Radio for the Cruising Yachtsman"
1981 Chris Long "Vale Gil Miles VK2KI — Vale History?"
1982 Alan Campbell-Drury VK3CD "Mayday"
1983 Max Hull VK3ZS "Pioneers of AR in Aust — Max Howden"
1984 Reg Glanville VK2ELG "Clandestine SWLing"
1985 Marlene Austin VK5QO "History of the VK5 Division"

The Award has always comprised an attractive wooden plaque, plus an amount of money, originally $10. This was raised to $15 in 1978, $30 in 1981, and now stands at $100. Who will win it in 1986?

ar

ANTENNA ARRAYS

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PART 2 — The Program

In part one, a number of equations were given which are the basis of the basic program presented here in listing 1.

A few general comments are needed before we begin the discussion on how the program works.

Firstly, as it stands, the program is written for the pseudo MSX Basic of the SVI 318/328 and as such is not directly applicable to such common machines as the Commodore 64 or Microbee. While versions have been modified to run on these machines, it is beyond the scope of this article to describe exactly how this conversion was done. If sufficient interest is shown perhaps this can be the subject of a future article. In the meantime, the program as shown should run with very minor changes on most machines that run a late version of Microsoft Extended Basic.

For example, a version when directly ported across to an Epson PX-8 worked with no changes other than those in the graphics area necessary to cope with the small LCD screen. It should also be noted that different Basics on different machines will produce slightly different results. This is mostly due to the differences in accuracy of the supplied functions and the number of significant digits used along with the machines dynamic range; ie difference between smallest and largest number.

Previously, (References 3 and 6), Fortran has been used on large computers to solve array problems. One of the reasons for this will become obvious to any user of this Basic version, in that it is very slow. For example, a three element array can take up to 25 minutes to calculate true directive gain, or 60 seconds to just calculate the impedances. This should not overly dismay the amateur but, the professional would find the delays excessive. In order to overcome this, in part, the program has been structured in a menu driven format which allows the amateur some control of a trade off between accuracy and time taken.

SECTION 1 — INPUT PARAMETERS

This section, up to line 220, collects data on the array. Unless otherwise stated, all dimensions are input in metres, and all angles in degrees. The elements are positioned on the co-ordinated plane as specified in Part 1, on the X-Z plane; ie Phi = zero. The preferred direction for straight ahead, or the front of the array is 0 and the back 180.

SECTION 2 — IMPEDANCE CALCULATIONS

This section, line 220 to 985, computes the self and mutual impedances of all array elements. It does this using the equations given in Reference 1 which use two functions called sine and cosine integrals. These two functions are evaluated by subroutines at lines 15000 and 14000 respectively. More details on this will be given in a later article.

SECTION 3 — COMPLEX EQUATION SOLVER

Once the impedances have been found, they are assembled into a number of simultaneous equations. The simultaneous equation solver proper is contained in subrouting 40000, however, as standard Basic cannot directly handle complex numbers, the rest of the code in this section, lines 990 to 1460, is involved in manipulating the equations into twice as many real equations.

SECTION 4 — THE MENU

Once the equations have been solved, control is handed to a menu to decide what to do next. This section, lines 1480 to 1520 and subroutine 11000, offer a number of alternatives and some comment should be given on each.

1. Input impedances — Subroutine 19000. This option will give the input impedances as seen at the centre of all elements. Note these are theoretical values only, plus for any non-driven element; ie voltage equal to 0 angle 0, the impedance will be zero. This of course does not mean that the current will be zero.

2. Change Some Values — Subroutine 22000. Here the user is given the option to go back and change or vary some parameter to see its effect. Note: this routine does not recalculate, after all changes have been made, it will still be necessary to select option (8) and thus recalculate all values. Failure to do this invalidates all results.

3 and 4. Plot E and H Plane — Subroutine 23000 and 24000. As discussed in Part one, the E and H plots show the array pattern. This option gives only the bare bones of the possible graphics routines, as most other machines will have differing modes, etc . . . As it stands, once a complete pattern has been plotted, the operator must hit any key to continue.

5. Calculate Gain and F/B — Subroutine 25000. This is the one that takes the time. It must do the numerical integration spoken of in Part one, over the surface of a sphere. As it stands, it does this in 10 degree increments and, on the SV1318, it takes about 25 minutes for a three element array. This routine is however totally arbitrary as to the pattern is can operate on. This means that no matter what strange configurations are used, the correct answer will eventually be found.

6. Print Currents — Subroutine 26000. This option shows the complex currents flowing in each element.

8. Re-Run — Subroutine 22300. As mentioned previously, this is used in conjunction with option 2 and 10. Option 2 can be chosen any number of times with no other routines between. It is only necessary to choose option 8 before choosing any other option after a series of option 2s or 10s.

9. Review an Element — Subroutine 22200. As the name suggests, this just lists an elements attributes.

10. Change Frequency — Subroutine 22400. This routine is similar to 2 in most respects save it changes the test frequency. Once again it is necessary to option 8 after 10.

11. Quick Gain — Subroutine 16400. As the name suggests, this is a very much quicker version of option 5. It does this by assuming that the antenna pattern is symmetrical about the Z-axis and, only performs the integration over one quadrant. For most Yagi antennas, ie with elements all in the Z-plane, this routine will produce very similar results to option 5.

12. Quick F/B — Subroutine 16700. This routine provides a quick version of front to back, assuming that the front is at Theta equals zero and the back at Theta equals 180.

13. End. Finish program.

In the next part, more details will be given on implementing the program on a micro-computer as well as some of the results that can be obtained.

REFERENCES:
1. J D Kraus — Antennas, McGraw Hill New York 1950.
3. J L Lawson — Yagi Antenna Design, Ham Radio January 1980.
6. S Jaffin — Applied Yagi Antenna Design, Ham Radio May 1984.

```
00002 DEFINT I,J,K,L,N
00010 GOSUB 20000
00030 DIM X(20),A(10,22),B(20,22),EC(10,4),EP(10,4),EA(10,2),EV(10,2),EZ(10,2)
00032 DIM I2(20),ES(10)
00040 INPUT "HOW MANY ELEMENTS IN ARRAY ";NE
00050 PRINT "WHAT IS THE FREQUENCY OF INTEREST "
00055 INPUT "IN MEGAHERTZ ";FR
00060 PRINT "ELEMENT NO 1 IS ASSUMED TO HAVE "
00070 PRINT "VOLTAGE IN 1<0"
00080 PRINT "POSITION PHI 0, DISP 0"
00090 INPUT "WHAT IS ITS DIAM AND LENGTH(M) ";EA(1,1),EA(1,2)
00091 PI=3.141592654
00092 P2=6.283185308
00093 EU=.5772156649
00094 DR=PI/180
00100 EA(1,1)=EA(1,1)*FR/300
00110 EA(1,2)=EA(1,2)*FR/300
00120 EV(1,1)=1:EV(1,2)=0
00130 EP(1,1)=0:EP(1,2)=0
00135 ES(1)=0
00160 FOR I=2 TO NE
00170 GOSUB 12000
00180 NEXT I
00190 GOSUB 20000
00200 GOSUB 13000
00210 GOSUB 20000
00212 RF=0
00220 PRINT "FORMING Z MATRIX USING SINE"
00230 PRINT "AND COSINE INTEGRALS PLEASE WAIT"
00240 PRINT ".";
00290 FOR I=1 TO NE
00300 PRINT ".";
00310 XX=P2*EA(I,2)
00320 GOSUB 14000
00330 T1=2*XC
00340 XX=2*XX
00350 GOSUB 14000
00360 T1=XC-T1
00370 T1=.5*COS(XX/2)*(EU+LOG(XX/4)+T1)
00380 XX=XX/2
00390 GOSUB 15000
00400 T2=2*XS
00410 XX=2*XX
00420 GOSUB 15000
00430 T1=.5*SIN(XX/2)*(XS-T2)+T1
00440 XX=XX/2
00450 GOSUB 14000
00460 A(I,2*I-1)=60*(EU+LOG(XX)-XC+T1)
00470 XX=PI*EA(I,1)*EA(I,1)/EA(I,2)
00480 GOSUB 14000
00490 T1=XC
00500 XX=2*P2*EA(I,2)
```

```
00510 GOSUB 14000
00520 T1=T1+XC
00530 XX=XX/2
00540 GOSUB 14000
00550 T1=SIN(XX)*(2*XC-T1)
00560 XX=2*XX
00570 GOSUB 15000
00580 T2=XS
00590 XX=XX/2
00600 GOSUB 15000
00610 T1=COS(XX)*(2*XS-T2)-T1
00620 A(I,2*I)=30*(2*XS+T1)
00630 NEXT I
00640 FOR I=1 TO NE-1
00650 FOR J=I+1 TO NE
00660 PRINT ".";
00670 DM=2*EP(I,1)*EP(J,1)*COS(EP(I,2)-EP(J,2))
00680 DM=SQR(EP(I,1)*EP(I,1)+EP(J,1)*EP(J,1)-DM)
00690 T1=.5
00700 T2=SQR(DM*DM+T1*T1)
00710 XX=P2*(T2-T1)
00720 GOSUB 14000
00730 T3=XC
00740 XX=P2*(T2+T1)
00750 GOSUB 14000
00760 T3=T3+XC
00770 XX=P2*DM
00780 GOSUB 14000
00790 A(I,2*J-1)=30*(2*XC-T3)
00800 A(J,2*I-1)=30*(2*XC-T3)
00810 XX=P2*(T2-T1)
00820 GOSUB 15000
00830 T3=XS
00840 XX=P2*(T1+T2)
00850 GOSUB 15000
00860 T3=T3+XS
00870 XX=P2*DM
00880 GOSUB 15000
00890 A(I,2*J)=-30*(2*XS-T3)
00900 A(J,2*I)=-30*(2*XS-T3)
00910 NEXT J
00920 NEXT I
00930 PRINT
00940 FOR I=1 TO NE
00950 A(I,2*NE+1)=EV(I,1)*COS(EV(I,2))
00960 A(I,2*NE+2)=EV(I,1)*SIN(EV(I,2))
00970 NEXT I
00980 GOSUB 20000
00982 FOR I=1 TO NE
00983 A(I,2*I-1)=A(I,2*I-1)+ES(I)
00985 NEXT I
00990 PRINT "DONE NOW SOLVE ";NE;" COMPLEX"
01000 PRINT "SIMULTANEOUS EQUATIONS "
01010 PRINT "PLEASE WAIT "
01020 PRINT ".";
01030 FOR I=2 TO 2*NE STEP 2
01040 FOR J=1 TO 2*NE+2
01050 PRINT ".";
01060 B(I-1,J)=(-1)^(J+1)*A(I/2,J)
01070 IF J/2=INT(J/2)THEN B(I,J)=A(I/2,J-1)ELSE B(I,J)=A(I/2,J+1)
01080 NEXT J
01090 NEXT I
01100 PRINT
01105 GOSUB 40000
01340 PRINT
01350 FOR I =1 TO NE
01360 PRINT ".";
01370 EC(I,3)=X(2*I-1)
01380 EC(I,4)=X(2*I)
01390 EC(I,1)=SQR(EC(I,3)*EC(I,3)+EC(I,4)*EC(I,4))
01400 EC(I,2)=ATN(EC(I,4)/EC(I,3))
01401 IF EC(I,3)<0 THEN EC(I,2)=EC(I,2)+PI
01410 NEXT I
01420 PRINT
01430 GOSUB 20000
01440 PRINT " DONE, ALL CURRENTS HAVE "
01450 PRINT "NOW BEEN FOUND "
01455 GOSUB 16000
01460 PRINT
01470 GOSUB 18000
01480 GOSUB 20000
01490 IF RF=1 THEN 210
01495 GOSUB 11000
01500 INPUT " CHOICE  ";Q
01510 ON Q GOSUB 19000,22000,23000,24000,25000,26000,27000,22300,22200,22400,164
00,16700,65000
01520 GOTO 1480
11000 PRINT "(1) INPUT IMPEDANCES  (11) QUICK GAIN"
11010 PRINT "(2)CHANGE SOME VALUES (12) QUICK F/B"
11020 PRINT "(3)PLOT E PLANE       (13) END"
11030 PRINT "(4)PLOT H PLANE "
11040 PRINT "(5)CALC GAIN AND F/B "
11050 PRINT "  (THIS ONE MAY TAKE"
11060 PRINT "    SOME TIME)"
11065 PRINT "(6) PRINT CURRENTS"
11070 PRINT "(8) RE-RUN "
11075 PRINT "(9) REVIEW AN ELEMENT "
11076 PRINT "(10) CHANGE FREQ "
11080 RETURN
12000 GOSUB 20000
12010 PRINT "FOR ELEMENT ";I;" INPUT "
12020 PRINT
12030 PRINT "VOLTS IN (FOR PARASITIC "
12040 INPUT " =0,0) MAG,PHASE(DEGS) ";EV(I,1),EV(I,2)
12045 EV(I,2)=EV(I,2)*DR
12050 PRINT "POSITION RELATIVE TO EL 1"
12060 PRINT "ANGLE (DEGS),DISPLACEMENT(METRES)"
12070 INPUT "   ";EP(I,2),EP(I,1)
12080 EP(I,2)=EP(I,2)*DR
12090 EP(I,1)=EP(I,1)*FR/300
12100 PRINT
12110 PRINT "DIAM AND LENGTH "
12120 INPUT "IN METRES ";T1,T2
12130 EA(I,1)=T1*FR/300
12140 EA(I,2)=T2*FR/300
12145 INPUT "SERIES R OHMS ";ES(I)
12150 GOSUB 18000
12160 RETURN
13000 PRINT " DO YOU WISH TO REWIEW OR CHANGE"
13010 INPUT " ANY ELEMENT (YES/NO)";QQ$
13020 IF LEFT$(QQ$,1)<>"Y" THEN 13100
13030 INPUT "REVIEW OR CHANGE (R/C) ";QQ$
13040 IF LEFT$(QQ$,1)="C" THEN GOSUB 22000
13050 GOSUB 22200
13060 GOSUB 20000
13070 GOTO 13000
13100 RETURN
14000 REM COS INTEGRAL
14010 NN=INT(XX*1.5+5)
14020 XC=1
14030 XC=1-XC*(XX*XX*NN)/((4*NN+2)*(NN+1)*(NN+1))
14040 NN=NN-1
14050 IF NN>0 THEN 14030
14060 XC=EU+LOG(XX)-XC*XX*XX/4
14070 RETURN
15000 REM SIN INTEGRAL
15010 NN=INT(1.5*XX+5)
15020 XS=1
15030 XS=1-XS*(XX*XX*(NN-.5)/(NN*(2*NN+1)*(2*NN+1)))
15040 NN=NN-1
15050 IF NN>0 THEN 15030
15060 XS=XS*XX
15070 RETURN
16000 FOR I=1 TO NE
16010 EZ(I,1)=EV(I,1)/EC(I,1)
16020 EZ(I,2)=(EV(I,2)-EC(I,2))/DR
16030 NEXT I
16040 FOR I=2 TO NE
16050 EC(I,1)=EC(I,1)/EC(1,1)
16060 EC(I,2)=EC(I,2)-EC(1,2)
16070 NEXT I
16080 EC(1,1)=1
16090 EC(1,2)=0
16091 FOR I=1 TO NE
16092 EC(I,3)=EC(I,1)*COS(EC(I,2))
16093 EC(I,4)=EC(I,1)*SIN(EC(I,2))
16094 NEXT I
16095 RETURN
16100 SP=SIN(PH*DR)
16105 CP=COS(PH*DR)
16110 CT=COS(TH*DR)
16120 ST=SIN(TH*DR)
16130 SI=0
16140 SR=1
16150 FOR IT=2 TO NE
16160 T1=P2*EP(IT,1)*(SIN(EP(IT,2))*ST*SP+COS(EP(IT,2))*CT)+EC(IT,2)
16170 SR=SR+EC(IT,1)*COS(T1)
16180 SI=SI+EC(IT,1)*SIN(T1)
16190 NEXT IT
16200 F2=SR*SR+SI*SI
16210 F1=0
16220 T1=ST*CP
16230 T2=SQR(1-T1*T1)
16240 IF T2=0 THEN 16260
16250 F1=COS(PI*T1/2)/T2
16260 F2=F1*F1*F2
16270 RETURN
16400 T2=170*DR
16410 T3=10*DR
16420 UM=0
16425 PR=0
16430 FOR TH=0 TO T2 STEP T3
16440 SR=1
16450 SI=0
16460 FOR IT=2 TO NE
16470 T1=P2*EP(IT,1)*COS(EP(IT,2)-TH)+EC(IT,2)
16480 SR=SR+EC(IT,1)*COS(T1)
16490 SI=SI+EC(IT,1)*SIN(T1)
16500 NEXT IT
16510 F2=SR*SR+SI*SI
16520 IF F2>UM THEN UM=F2
16530 UA=P2*T3*F2*SIN(TH)
16540 PR=PR+UA
16550 NEXT TH
16560 DI=4*PI*UM/PR
16570 GI=4.342944819*LOG(DI)+2.15
16580 GOSUB 20000
16590 PRINT USING " GAIN IS APPROX = ***.** DBI ";GI
16600 GOSUB 18000
16610 RETURN
16700 GOSUB 20000
16710 GOSUB 25150
16720 RETURN
18000 INPUT "HIT ENTER TO CONTINUE ";QQ$
18010 RETURN
19000 REM DRIVING IMPEDANCES
19010 GOSUB 20000
19020 FOR I=1 TO NE
19030 PRINT "FOR ELEMENT NO. ";I
19040 TZ=EZ(I,1)
19050 TX=EZ(I,2)
19055 IF TZ<1E-04 THEN TX =0
19060 PRINT USING "IMPEDANCE= ***.*** ANGLE ***.** DEGS ";TZ,TX
19068 TX=TX*DR
19070 T1=TZ*COS(TX)
19080 T2=TZ*SIN(TX)
19090 PRINT "OR"
19100 PRINT USING "  ***.***   + J  ***.*** ";T1,T2
19110 PRINT
19120 PRINT
19130 NEXT I
19135 GOSUB 18000
19140 RETURN
20000 CLS
20010 PRINT " GENERAL PURPOSE ANTENNA ARRAY ANALYSER"
20020 PRINT " BY PAUL MCMAHON VK3DIP   10/11/85 "
20030 PRINT
20040 RETURN
22000 GOSUB 20000
22010 INPUT "WHICH ELEMENT DO YOU WISH TO CHANGE ";NC
22020 IF NC>NE THEN 22100
22030 I=NC
22035 GOSUB 12000
22040 RETURN
22100 PRINT "THIS IS LARGER THAN THE CURRENT"
22110 PRINT "SIZE OF THE ARRAY "
22120 INPUT "DO YOU WISH TO ADD IT ";QQ$
22130 IF LEFT$(QQ$,1)<>"Y" THEN 22000
22140 PRINT "THIS WILL BE ADDED AS ELEMENT ";NE+1
22145 NE=NE+1
22147 NC=NE
22149 GOSUB 18000
22150 GOTO 22030
22200 GOSUB 20000
22210 INPUT "WHICH ELEMENT TO REVIEW ";NC
22220 I=NC
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22230 PRINT "FOR ELEMENT ";I
22240 PRINT
22250 PRINT "VOLTS IN (FOR PARASITIC "
22260 PRINT " =0,0) MAG,PHASE(DEGS) ";EV(I,1),EV(I,2)/DR
22262 PRINT "POSITION RELATIVE TO EL 1"
22263 PRINT "ANGLE (DEGS),DISPLACEMENT(METRES)"
22264 T1=EP(I,2)/DR
22265 T2=EP(I,1)/(FR/300)
22270 PRINT "    ";T1,T2
22272 PRINT
22273 PRINT "DIAM AND LENGTH "
22274 T1=EA(I,1)*300/FR
22276 T2=EA(I,2)*300/FR
22280 PRINT "IN METRES ";T1,T2
22282 PRINT "SERIES R OHMS ";ES(I)
22285 GOSUB 18000
22290 RETURN
22300 RF=1
22310 RETURN
22400 GOSUB 20000
22410 INPUT "WHAT IS NEW FREQ (MHZ) ";F2
22420 FOR I=1 TO NE
22430 EP(I,1)=EP(I,1)*F2/FR
22440 EA(I,1)=EA(I,1)*F2/FR
22450 EA(I,2)=EA(I,2)*F2/FR
22460 NEXT I
22465 FR=F2
22470 RETURN
23000 PH=0
23005 GOSUB 23700
23006 SCREEN 1
23007 PRINT " VK3DIP"
23008 LOCATE 180,10
23009 PRINT "LOG SCALE"
23010 TH=0
23016 CIRCLE (96,96),96,4
23017 CIRCLE (96,96),64,4
23018 CIRCLE (96,96),32,4
23019 PSET (96,96),4
23020 GOSUB 16100
23030 GOSUB 23100
23032 LOCATE 180,30
23033 PRINT "10DB/DIV"
23040 FOR TH=10 TO 360 STEP 10
23050 GOSUB 16110
23060 GOSUB 23100
23070 NEXT TH
23071 LOCATE 200,150
23072 PRINT "HIT ANY"
23073 LOCATE 200,180
23074 PRINT "KEY "
23075 QQ$=INKEY$
23077 IF QQ$="" THEN 23075
23078 SCREEN 0
23080 RETURN
23100 IF F2=0 THEN F2=1E-07
23101 T3=32*(.43429*LOG(F2/T4)+3)
23102 IF T3<0 THEN T3=0
23105 XP=96+T3*COS(TH*DR)
23110 YP=96-T3*SIN(TH*DR)
23120 PSET(XP,YP)
23130 RETURN
23700 T7=PH
23710 GOSUB 20000
23720 PRINT "MAXIMUM GAIN IN WHAT DIRECTION "
23730 INPUT " THETA,PH (DEGS) ";TH,PH
23740 GOSUB 16100
23750 T4=F2
23755 PH=T7
23760 RETURN
24000 PH=90
24010 GOTO 23005
25000 REM GAIN
25002 PR=0
25004 MX=0
25030 FOR PH=10 TO 360 STEP 10
25050 FOR TH=10 TO 180 STEP 10
25060 RT=TH*DR
25070 GOSUB 16100
25080 IF F2>MX THEN MX=F2
25090 UA=.030461742*F2*SIN(RT)
25100 PR=PR+UA
25110 NEXT TH
25120 NEXT PH
25130 DI=4*PI*MX/PR
25135 GOSUB 20000
25140 PRINT "GAIN = ";4.342944819*LOG(DI);"DBI"
25150 PH=90
25160 TH=0
25170 GOSUB 16100
25180 T5=F2
25190 TH=180
25200 GOSUB 16100
25210 T5=4.342944819*LOG(T5/F2)
25220 PRINT " FRONT TO BACK = ";T5;"DB"
25230 GOSUB 18000
25240 RETURN
26000 REM PRINT CURRENTS
26010 GOSUB 20000
26020 FOR I=1 TO NE
26030 PRINT "ELEMENT NO. ";I
26040 PRINT USING "CURRENT= ###.### ANGLE ###.## DEGS.";EC(I,1),EC(I,2)/DR
26060 PRINT USING " ###.### + J ###.### ";EC(I,3),EC(I,4)
26070 PRINT
26080 PRINT
26090 NEXT I
26095 GOSUB 18000
26100 RETURN
27000 RETURN
40000 N=NE*2
40005 FOR I=1 TO N
40010 X(I)=B(I,N+1)
40020 I2(I)=0
40030 NEXT I
40040 D3=1
40050 FOR I=1 TO N
40060 B1=0
40070 FOR J=1TO N
40080 IF I2(J)=1 THEN 40170
40090 FOR K=1 TO N
40100 IF I2(K)>1 THEN 60000
40110 IF I2(K)=1 THEN 40160
40120 IF B1>=ABS(B(J,K)) THEN 40160
40130 I3=J
40140 I4=K
40150 B1=ABS(B(J,K))
40160 NEXT K
40170 NEXT J
40180 I2(I4)=I2(I4)+1
40210 IF I3=I4 THEN 40280
40220 D3=-D3
40230 FOR L=1 TO N
40240 SWAP B(I3,L),B(I4,L)
40250 NEXT L
40270 SWAP X(I3),X(I4)
40280 P1=B(I4,I4)
40290 D3=D3*P1
40300 B(I4,I4)=1
40310 FOR L=1TO N
40320 B(I4,L)=B(I4,L)/P1
40330 NEXT L
40350 X(I4)=X(I4)/P1
40360 FOR L1=1 TO N
40370 IF L1=I4 THEN 40440
40380 T=B(L1,I4)
40390 B(L1,I4)=0
40400 FOR L=1 TO N
40410 B(L1,L)=B(L1,L)-B(I4,L)*T
40420 NEXT L
40430 X(L1)=X(L1)-X(I4)*T
40440 NEXT L1
40450 NEXT I
40610 RETURN
60000 PRINT "MAT ERROR "
60010 STOP
65000 END
```

International News

RESTRUCTURING THE CANADIAN AMATEUR SERVICE

Following are the recommendations made by the CRRL and the CARF, Canada's two national organisations.

Permit home-built equipment for all classes of certificate.

Use a no-code entry level certificate, *Certificate B*, to attract newcomers to the amateur service.

Base *Certificate B* on 40 hours of study of basic electronic theory, basic electronic circuits, receiving and transmitting systems, antennas and propagation, station set-up and operation, interference prevention, and radio regulations.

Allow holders of *Certificate B* to use up to 100 watts input with all modes on amateur bands above 30 MHz.

Offer attractive incentives such as 250 watts input, and CW and RTTY on amateur bands below 30 MHz, to encourage holders of *Certificate B* to work for a seven words per minute *Code Endorsement*.

Also, offer phone in the 28-29.700 MHz band, as is done in 14 jurisdictions around the world, to holders of *Certificate B* with the *Code Endorsement* to give them a sample of privileges they could enjoy with the highest-class certificate, *Certificate A*.

Base *Certificate A* on 20-30 hours of study of advanced electronic theory, receiver and transmitter circuitry, and antenna systems, and 12 WPM Morse code.

Allow holders of *Certificate A* to use maximum legal power with all modes on all amateur bands.

The national organisations spent considerable time developing these recommendations. They had to consider the needs of the amateur radio community and the needs of DOC. They had to ensure that their proposed structure would be attractive to newcomers, offer strong incentives to upgrade and stress high standards throughout.

From *CRRL News*, June 15, 1986

QSP

VIATEL TAKES OFF

The performance of Australia was second only to France in the introduction of Videotex Information Services.

Telecom's Viatel service has 16 000 users and more than 200 independent organisations are providing information to the service.

THE JOY OF BEING AN EDITOR . . .

Getting out this journal is no picnic,
If we print jokes people say we are silly;
If we don't they say we are too serious.
If we copy things from other magazines,
We are too lazy to write them ourselves;
If we don't print all contributions,
We don't appreciate true genius . . .
If we print them the journal is filled with junk,
If we make a change in the wording of a contribution,
We are too critical;
If we don't we are criticised.
It is quite likely someone will say that we even borrowed this from some other magazine;
As a matter of fact *we did.*

Adapted from *BARG NEWS* June 1986

ANDREWS COMMUNICATIONS SYSTEMS

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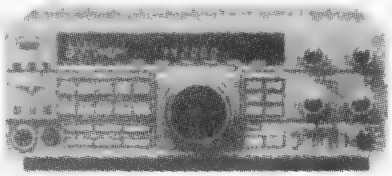

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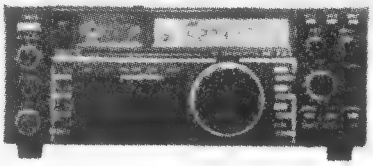

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Excellent receive performance HF transceiver w/12 ch memory, 100W RF o/p, SSB-CW-AM-FM, 0.1-30 MHz rx, PBT, notch, etc. Full 12 months warranty.

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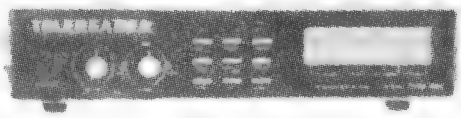

TELEREADER CWR-880 RTTY/CW TERMINAL $579
Telereader CWR-880 allows CW/RTTY/AMTOR reception. This amazing new communications terminal features an LCD screen with 16 characters x 2 lines.
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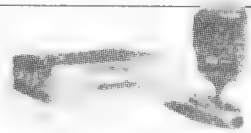
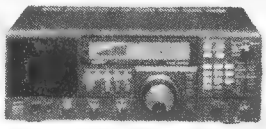


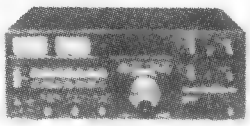
FT-270H **$679** ~~$879~~
Yaesu FT-270H 2m FM features 10 ch memory, rptr, 45/5W o/p, 0.2 uV sensitivity, PMS.



FRG-8800 **$950** ~~$1145~~
Yaesu FRG-8800 comms receiver allows 150 kHz to 30 MHz reception. AM/FM/SSB/CW.

Inc MMB-28 bracket

FRG-965 **$950** ~~$1090~~
Yaesu FRG-965 V/UHF scanning receiver covers 60-905 MHz. AM/FM/SSB. AC/DC.

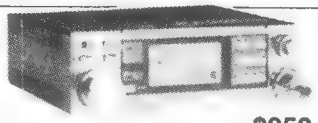


70cm

FT-726R **$1899** ~~$2120~~
Yaesu FT-726(R) SSB/FM/CW, 10W o/p, AC/DC transceiver.
inc 2m mic, DC.

KENWOOD TM-201B
$495

FM 2m 45/5W mobile, 5 ch memory transceiver. Compare to KYOKUTO and AZDEN 25W radios.
12 months warranty on our Kenwood.



YAESU FT-2700RH **$950** ~~$1095~~
Dual bander, 70cm/2m, 25W, FM, 0.2 uV, 10 ch mem, PMS.

Professional scanning receiver covers 25-550 and 800-1300 MHz in two continuous tuning ranges. AM/FMN/FMW, 0.3 uV AC/DC. Priority, delay, etc.

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KURANISHI FC-965 . $219
Converts 0.5-60 MHz signals up to 60.5-120 MHz thereby allowing MW/SW/Low VHF reception with the FRG-965 or similar rx.

UNIDEN RD-9 NOT $499, OUR PRICE $449. RADAR DETECTOR

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AN AMATEUR RADIO ENGINEERING PROJECT

Kenneth Kimberley VK2PY
21 Nicoll Street, Lakemba, NSW. 2195

This paper traces the development of a precision 10 MHz "reference" oscillator and later, a square wave generator locked to the reference. The expected range of the generator would be from approximately 0.1 hertz to three megahertz.

Since work began on the above, it has been ascertained that 5 MHz is often used within the industry in lieu of 10 MHz. Does this imply that the lower frequency is more stable, or is it merely economic consideration? My opinion is that it is a little of both!

The basic accuracy and stability of the proposed generator will be governed by the reference. Hence, it was decided to concentrate work on the crystal oscillator and develop it as far as practical.

Most of the amateur radio type literature tends to treat quartz oscillators fairly lightly. This gives the impression that their design and subsequent construction is relatively simple. Nothing could be further from the truth, as the author discovered. This, I might add, at the cost of considerable time and pocket money.

Having got through the preamble, it is now time to get down to the nitty gritty. Firstly, what circuit would be used? It was noticed that a lot of equipment uses an oscillator based on Ic gates. The only external components required being two resistors, a trimmer, the crystal and naturally the IC.

The absence of a "LC" circuit and tricky feedback adjustments make this oscillator look very attractive indeed. Hence, it was decided to proceed along these lines. Refer to Figure 1 for details and component values, etc.

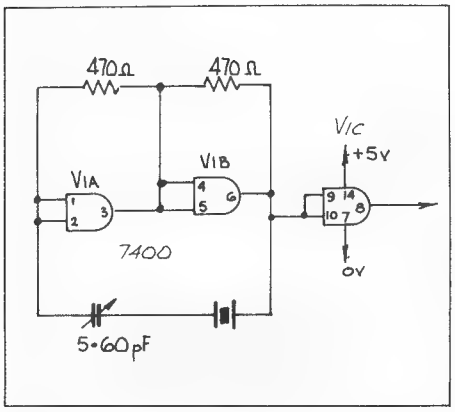


Figure 1 — Series Mode Oscillator using TIL Gates.

The use of a TTL device (7400) was more or less dictated by virtue of the high operating frequency. Having settled on the circuitry, off went the cheque to one of the *Amateur Radio* advertisers and soon two beautiful little rocks arrived.

No technical specifications were supplied, however the covers were stamped 10.000.000. The frequency must be correct. I found out otherwise — the hard way.

Now out with the soldering iron, "blob" type proto-board and the small components. Sockets for both the crystal and IC were cannibalised from some long unfinished project. Some 30 minutes later the thing was up and running — beaut!

The counter was then switched on and both allowed to stabilise for about one hour. The frequency was then adjusted to an indicated frequency of exactly 10.000 MHz. Now, as the reader will agree there is not any point in pushing ones luck too far. Therefore, it was decided that as the next day was a Saturday, the equipment would be left running all night.

Surprise, surprise. Murphy had come visiting overnight and had slyly changed the frequency. Considering that the previous night's stabilisation had not been sufficient, the trimmer was readjusted.

About this time, a friend visited the shack. As he walked past the work area the frequency changed. Each time he walked past he produced similar results, as did opening and closing the window. Apparently, the breeze thus produced varied the temperature sufficiently to move the frequency. The second crystal (number 2) behaved in a similar manner.

Placing the oscillator into a cardboard box eliminated this effect quite nicely.

LESSON NUMBER ONE

Open type construction is definitely not conducive to good stability in oscillators.

The nest problem to be addressed was the rather long and uncertain warm-up period, which was somewhat masked by the previously mentioned problem. This erratic operation appeared to be caused by some thermal effect. Now, what can heat up in such a low power circuit? Neither smoke or charring being visible meant that it was time to introduce the good old "calibrated finger" technique.

This was poked hither and thither around inside the box and it eventually landed onto the 7400, which was quite warm.

The finger in contact with the top of the IC acted as a heat sink. As its temperature dropped so did the frequency.

The fitting of another 7400 did not improve things, so a 74LS00 was tried. This lower-powered device produced less heat and did not effect the frequency as much. However, the drift was still quite unacceptable!

LESSON NUMBER TWO

The active element can, and does have an adverse reaction on the oscillator.

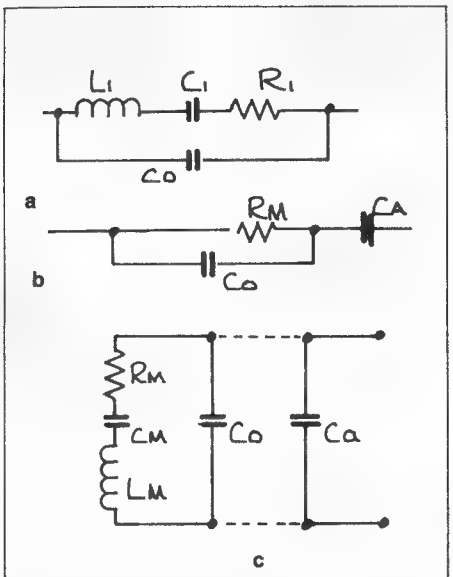


Figure 2 — Equivalent Circuits of a Crystal

Well, how to proceed from here? Further work on the drawing board and more reading was required.

It was learned that parallel mode oscillators seem to be intrinsically more stable than series versions. It appears as though most simple and "on chip" oscillators are of the series type.

These are mainly used where the stability requirements are not so stringent. Hence, most of the cheaper rocks advertised and sold locally are cut and calibrated for series mode at 25 degrees Celsius. More of this later.

DEFINITIONS

At this stage, a brief explanation of the terms series and parallel modes will be given.

The generally accepted equivalent circuit of a quartz crystal is shown in Figure 2a, where Co represents the static (shunt) capacitance and is the sum of the capacitance between the electrodes and all of the other strays. The R_1, L_1 and C_1 network is known as the motional where C_1 is the motional capacity of the blank. L_1 is a function of the mass and the R_1 is the total losses.

FORMULAS

L_1 =Motional Inductance $= \dfrac{1}{4\pi^2 F_S^2 C_1}$

C_1 =Motional Capacitance $= \dfrac{2(C_0+C_L)\Delta F}{F_S}$

ΔF =Change in Frequency $= \dfrac{F_S C_1}{2(C_0+C_L)}$

Q =Quality Factor $= \dfrac{1}{2\pi F_S C_1 R_1}$

R = Equivalent Series R $= \dfrac{2\pi F_S L_1}{Q}$

C_0 Shunt Capacity

C_L Load Capacity

C_T Total Capacity

SERIES RESONANCE (FS)

Other names are the Motional Resonance or zero point and it occurs when XL_1 equals XC_1; ie

$$FS = \frac{1}{2\pi\sqrt{L_1C_1}}$$

At this frequency the reactances cancel, hence the impedance is set by the Equivalent Series Resistance (ESR), and is of course resistive. Refer to Figure 2b. It is worth noting that series types of circuits will continue to oscillate when the crystal is replaced with a capacitor. The frequency being that at which the circuit has the greatest gain.

PARALLEL RESONANCE (FP)

There is another frequency at which a crystal looks resistive and this is when XLm and XCm plus XCo equals zero. This parallel, or anti- resonant frequency is given thus:

$$FP = \frac{1}{2\pi\sqrt{\frac{C0\,C1}{CT + C1}\,L1}}$$

The equivalent circuit for this condition is shown in Figure 2c. This point is also known as the pole. Hence the expression "FP."

When a crystal is operating near parallel resonance (FP) it will look inductive in the circuit. Some texts therefore refer to the Inductive Mode in lieu of parallel. Its impedance is maximum at FP. A change in circuit values will pull its frequency and therefore the load capacity should always be specified. For this mode the load capacity should be selected to operate at a point on the reactance curve as close as possible to FS.

The well tried and proven *Colpitts* circuit was chosen, so out came the 7400s. Put them in the junk box for future digital projects. Figure 4 shows a typical circuit and gives typical values, etc.

Almost any small signal transistor may be used for Q1, although higher gain units will allow greater stability. The circuit shown in Figure 4 was roughly put together and worked first try. However, the frequency could not be pulled lower than about plus one kilohertz from that desired. Crystal number two performed similarly.

Now refer to Figure 3. Notice that series resonance always occurs lower than the parallel frequency. The variation can be between say one and 10 kHz depending on cut, manufacturer, etc. It is not generally realised that a crystal calibrated for the parallel mode may generally be used for series providing that a "suitable trimming C" is employed.

However, the converse does not apply as was demonstrated by the performance of crystals one and two.

LESSON NUMBER THREE

The crystal must always be operated in the mode for which it was calibrated.

Ho, Hum — the last of the big spenders. So away with another cheque to a local manufacturer for crystal number three, ordered as a type DBD 40 10.000.000.

SPECIFIED CHARACTERISTICS

Cost — *Reasonable*

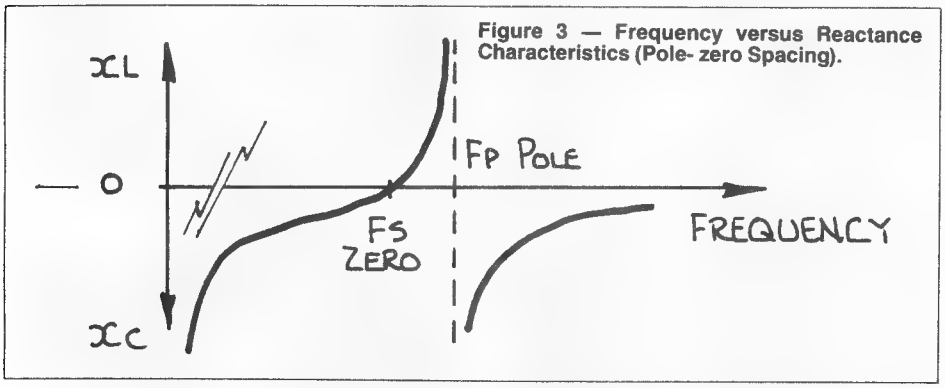


Figure 3 — Frequency versus Reactance Characteristics (Pole- zero Spacing).

POLE ZERO SPACING

Figure 3 demonstrates the frequency versus reactance characteristics of a quartz plate. Note that at frequencies below FS and above FP it becomes capacitive and of course at FS and FP is resistive.

The pattern repeats at each overtone frequency; ie third, fifth, seventh, etc.

COLPITTS OSCILLATOR

Having digressed a little, let us get back to our loading problems. It transpires that "parallel" circuits can be designed so that the active device has a minimal affect on the oscillator frequency.

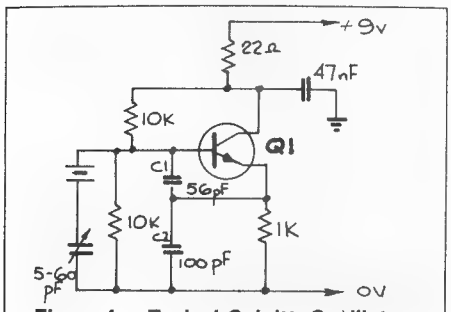


Figure 4 — Typical *Colpitts* Oscillator.

The quoted part number describes the crystal characteristics as follows:

D represents Temperature Range -10 to +60 degrees Celsius

B represents Temperature Stability ± 5 ppm
D represents Calibration Tolerance ± 5 ppm
UO represents Load Capacity of 40 pF

The crystal also has a resistance welded case which offers better long term stability than the solder or epoxy sealed types.

Whilst awaiting delivery of number three, the experiment continued. Already it was obvious that the Colpitts was much superior to the gate type oscillator. Thus work was concentrated in this direction.

Refer to Figure 4, feedback is governed by the ratio of C1:C2, reducing as C2 is increased. Additionally, larger values tend to mask minor changes within Q1, hence leading to higher stability, etc. Unfortunately, the law of "Diminishing Return" comes into play here. You see high "CS" progressively lowers the Z, Q and hence stage gain. It follows that a lower Q produces a broader bandwidth and consequently more oscillator noise, which could then be a problem in receiver mixers, etc. A value of 100 pF appears to be near the upper usable limit.

DARLINGTON PAIR

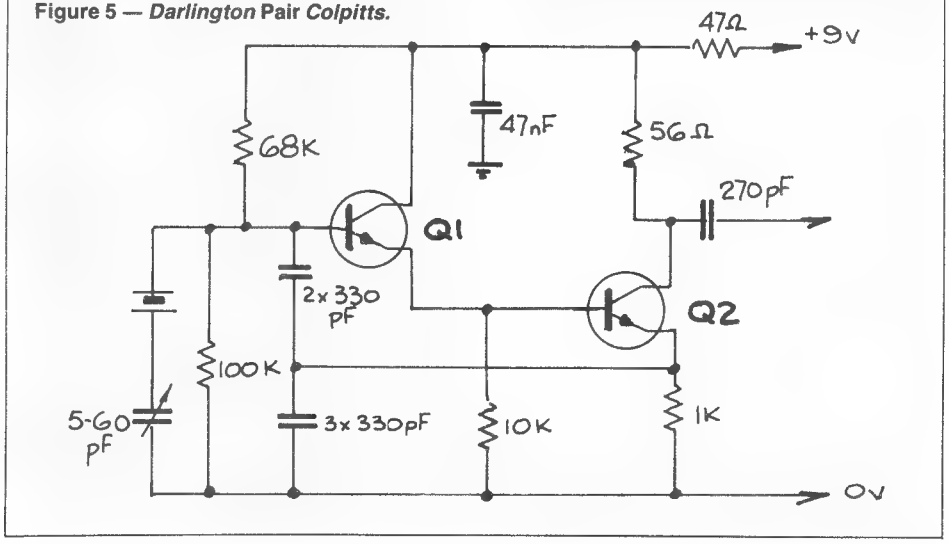
For the purist (myself included) further improvement may be made. The method suggested is to add another transistor, Q2, and connect both into a *Darlington* configuration. The idea is to achieve a much higher gain and input impedance, thus making possible the use of larger values in the capacitor divider. The upper limit now being around 1.0 nF, effectively swamping the reaction of the active devices on the oscillator frequency. Refer to Figure 5 for details.

At last the great day arrived — the little package containing crystal number three arrived. The new crystal was soon installed into the latest oscillator. A quick turn of the trimmer and the thing was running on 10.000.000 (indicated), whilst still exhibiting excellent stability. At this stage of development it would probably be satisfactory for most amateur requirements. The frequency shift had, by now, been reduced to an erratic ± few parts in 10^{-7}; ie several hertz in 10 MHz.

TEMPERATURE PROBLEM

Now why is this variation? The only uncontrolled parameter appeared to be temperature. Investigations along these lines were commenced. The requirement being a variable heat "hot box" and a thermometer. The hot box (oven) is made up as follows. Obtain a small cardboard box (about 100 x 60 x 60 mm) and make three suitable holes in the lid. One in the middle for the thermometer and

Figure 5 — *Darlington* Pair *Colpitts*.



the others approximately 40 mm away on either side. The heater connections come out through one, and the oscillator wires, the other.

Next, four 4.7 ohm wire wound resistors are obtained and located vertically in the box at the centre of each side. Bend the leads out of the way and then connect each resistor in series to give a total value of 19 ohms. Join an insulated wire to each end and thread same through the designated hole. Place the oscillator into the box and feed its associated cables out through the other hole. Replace the lid on the box, push thermometer into position and power the oscillator. A zero to 25 volt power supply is connected to the 19 ohm heater.

The PSU is now switched on and set at 20 volts, corresponding to about 20 watts dissipation into the hot box. The temperature should now rise steadily and if it reaches 80 degrees Celsius, all is well.

If not, the heater resistor will require alteration. Assuming 80 degrees Celsius is attained, switch heater off, allow oven to stabilise for say 10 minutes. Now, record heater voltage, temperature and frequency. Switch power back on, reduce output to 19 and do the recording bit again. Repeat the process at one volt decrements right down to zero.

A graph of the frequency varies temperature should now be drawn using an easily read scale; ie 1" = 10 degrees Celsius and 1" = 10 Hz. Refer to Figures 6 (crystal 3) and 7 (crystals 1 and 2) as examples. The voltage/temperature recordings will be of assistance for later measurements. The results obtained for crystal three were very instructive. Notice the linear drop from 25 to 44 degrees Celsius, followed by the sudden jump (10 Hz) with only one degree further increase. At this point, the frequency slowly climbs until 70 degrees Celsius is reached then another rapid drop followed by runaway at 75 degrees Celsius.

The manufacturers specify an operating range of from -10 degrees Celsius to +60 degrees Celsius for this crystal. As it would be too difficult to verify the low temperature characteristics, and in any case the actual operating point would be above 20 degrees Celsius, it was decided that having verified the 20 degrees Celsius to 60 degrees Celsius part of the manufacturers specifications not to proceed with the low temperature measurements.

OPERATING TEMPERATURE — COMPENSATION ETC

Temperature compensation could well be used between 20 and 40 degrees because of the approximate linear drop in frequency. However, stability would be degraded with further increase. This is due to the compensating capacitors now being virtually "out of phase."

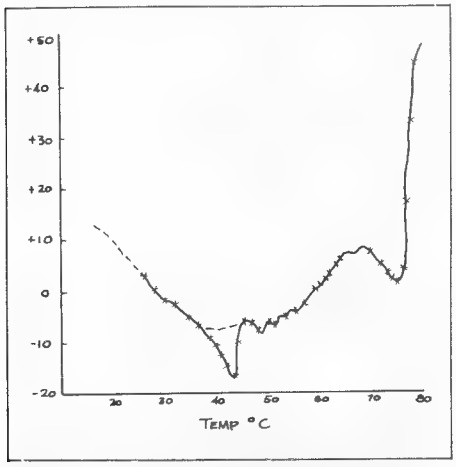


Figure 6 — Crystal Number Three, DBD40. Temperature versus Frequency Change.

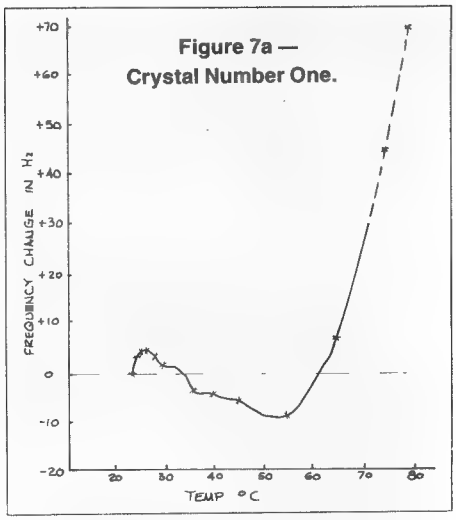


Figure 7a — Crystal Number One.

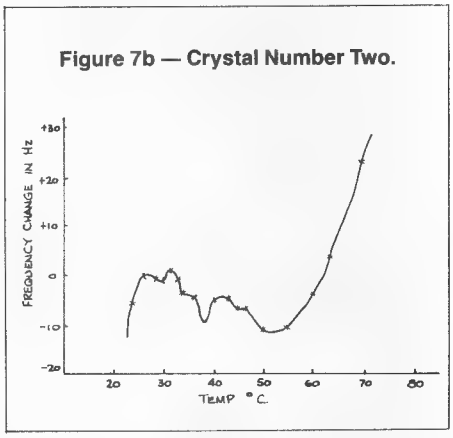


Figure 7b — Crystal Number Two.

Even though crystals one and two were discarded, it was decided to put them through a heat cycle. Refer to Figure 7 for the results, which over a limited temperature range, were surprisingly good. Observe the 27 degrees Celsius turn-over point and frequency change of only ±3.000 Hz between 24 and 33 degrees Celsius. This ties in well with the 25 degrees Celsius operation mentioned earlier. Again, compensation could be used between 27 and 55 degrees Celsius.

However, TCXOS are fiddly, compensating components hard to come by and usually require individual adjustment, thus making life difficult for the constructor silly enough to follow in my footsteps.

Note the flat spot between 35 and 45 degrees, even a relatively poor controller set at 40 degrees would be adequate here as a ±5 degrees change would only change the frequency by just 10.000 Hz.

The degree of control attainable persuaded the author that temperature control was a must. The proposed operating point was arrived at as follows. Allow say a maximum summer shack ambient temperature of 35 degrees plus. Add a further 10 degrees increase from associated circuitry, together with a fudge factor gives a total of say 50 degrees Celsius. The controller cannot work if set below the prevailing ambient.

Therefore, 55 degrees Celsius was selected and coincides with commercial practice. Yet another crystal (number four) was ordered, thus adding to my steadily growing collection of 10 MHz crystals! This one was specified as a type KBD40 10.000.00 (+ desired holder type), and having the following characteristics:

Cost — Expensive (Don't tell the cook)
Operating temperature — +50 to 60 degrees Celsius
Temperature Stability — ±5 ppm
Calculated Tolerance — ±5 ppm
Local Capacity — 40 pF
Sealing — Resistance Welded.

When number four duly arrived it was given the good-old heat treatment. Figure 8 depicts the results of these efforts. Despite the rather poor performance at lower temperatures, it was excellent between 50 and 60 degrees Celsius, exactly as ordered an ideal for the proposed 55 degrees Celsius operating point.

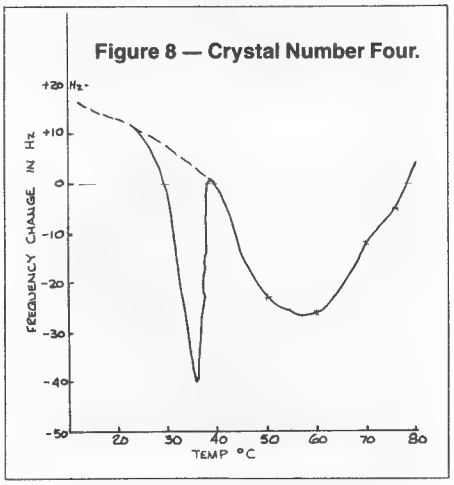


Figure 8 — Crystal Number Four.

LESSON NUMBER FOUR

Ensure that the crystal is always used at its specified temperature.

Next month, Part 2 of this article will describe the construction, adjustment and performance of the temperature controlled crystal oscillator.

To be continued . . .

ar

AEA SOLD

Antenna Engineering Australia (AEA) has been acquired by Kabelmetal Electro of West Germany.

AEA is a Melbourne-based company concerned with the design and manufacture of antennas, filters, diplexers, multi-couplers and associated equipment for communications, FM and AM broadcasting, television and navaids from low frequency to microwave.

From *Electronics News*, July 1986

VK SUPPLIES MODEMS TO JA

Datacraft has made significant sales of its Australian designed and made Telelink modems to the Tokyo office of an international bank.

Datacraft Telelink modems are designed to provide a cost effective solution to internal networking requirements, since they allow for simultaneous voice and data transmission, using existing PABX equipment and cables within a one kilometre range.

Datacraft's export team is now evaluating the potential of the Japanese market as there is no comparable product available there.

From *Electronics News*, July 1986

ELECTRONIC CAMERA

A filmless still-camera that captures images with a computer chip and plays them back via a television monitor is expected to on sale soon.

The system, which uses floppy disks, also allows a photographer to send pictures over telephone lines.

Using a device called a transceiver, images sent over a telephone line can be reproduced using an ink-jet printer.

The camera looks and acts like a conventional 35 mm camera, but instead of film, the image is captured using a special kind of chip called a charge- coupled device, which passes the signal to a 5 cm wide floppy disc.

Besides photo-journalists, the camera will be useful in law enforcement, construction, industry and science.

LEARN MORSE ON YOUR COMPUTER

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Your computer can be an excellent Morse instructor.

It is available whenever you want to practice, sends perfectly spaced Morse with no interference or fading — but there are a few traps, as I discovered. This article may help others to avoid them.

After 18 years of holding a limited call, and recently becoming interested in home computers for sending RTTY, there arose a need to experiment over a distance too great for VHF. So the home computer, a TRS80 MC10, was put to use to learn Morse for the 10 WPM upgrading licence test. A program called *Hamcode* was found in the book *TRS80 Colour Computer Programs.* This was typed in, the unnecessary punctuation characters being removed, and used each day to practice. The 80 metre Slow Morse Broadcasts (on 3.550 MHz, from VK2, from 1930-2030 and VK5, 2030-2130 UTC), were used a couple of times, but at my location and on my untuned piece of wire for an antenna, the signals were noisy and faded out most of the time. (It was not until later when I actually got the full call that the station and antenna were improved, along with the signals!).

There seemed to be no speed standard and tapes all had their own characteristic rhythm and speed.

The program has a variable called T to change the speed and as my Morse speed improved, T was reduced to reduce the space between the characters. I modified the program to send random five letter groups continuously.

Some Morse tapes from various sources, mainly copied from tapes used by other full calls also provided practice while driving to work, but one thing worried me. This was the fact that there seemed to be no speed standard and the tapes all had their own characteristic rhythm and speed — therefore I did not know what to expect in the exam. Unlike serial computer data, where you know that at 300 Baud the bits are all exactly 3.33 mS long, nothing seemed to be written about a standard for Morse speed. I simply changed T on the Morse program so that I got 250 random characters in five minutes and assumed that this represented 10 five letter words per minute.

After about three months of practice exam-time came around. The receiving was a nightmare. I had never heard Morse like this before; all dashes and long dashes. (The letter "S" sounded like an "O" for example). The practice session was not long enough to re-adjust my brain. The sending was easy with the message being rattled out with 29 seconds to spare, and this was after only about one hour of practice using a key beforehand.

I acquired a tape and proceeded to analyse it on a digital storage oscilloscope.

Less than one week before the exam, I heard about the Morse Classes run by the WIA and I phoned the class instructor, Ron Cannon. He said he could send me a copy of a Department

```
5 REM:HAM8
9 N=20000
10 POKE N,79:POKE N+1,151:POKE N+2,3
15 POKE N+3,134:POKE N+4,65
20 POKE N+5,189:POKE N+6,78:POKE N+7,64:POKE N+8,74:POKE N+9,38
21 POKE N+10,250:POKE N+11,134:POKE N+12,1:POKE N+13,151
22 POKE N+14,3:POKE N+15,57
25 POKE N+16,79:POKE N+17,151:POKE N+18,7
30 POKE N+19,134:POKE N+20,159
35 POKE N+21,189:POKE N+22,78:POKE N+23,64:POKE N+24,74:POKE N+25,38:POKE N+26,2
50:POKE N+27,134
36 POKE N+28,1:POKE N+29,151:POKE N+30,3:POKE N+31,57
40 POKE N+32,198:POKE N+33,255:POKE N+34,90:POKE N+35,1
41 POKE N+36,38:POKE N+37,252:POKE N+38,57
90 CLS
120 GOTO 2000
130 W=ASC(R$)-39:IF W<0 OR W 51 THEN 220
140 T$=C$(W):IF T$<>" " THEN 220
150 FOR J=1 TO LEN(T$):W$=MID$(T$,J,1)
160 IF W$="." THEN EXEC 20000
161 IF W$="-" THEN EXEC 20016
190 FOR D=1 TO 45:NEXT
200 NEXT:FOR J=1 TO 7Z*T:NEXT
210 RETURN
220 SOUND 8,8:RETURN
250 FOR K=1 TO LEN(P$):R$=MID$(P$,K,1)
260 IF ASC(R$)=32 THEN 280
270 GOSUB 130:NEXT:RETURN
280 FOR J=1 TO 558:NEXT
290 NEXT:PPINT:RETURN
300 PPINT"PRESS A KEY TO HEAR"
310 R$=INKEY$:IF R$="" THEN 310
320 W=ASC(R$):IF W=21 THEN 2100
330 IF W<39 OR W>90 THEN 350
340 IF C$(W-39)<>"X" THEN 360
350 SOUND 8,8:GOTO 310
360 PRINT R$::GOSUB 130:GOTO 310
400 PRINT:PRINT"ENTER PHRASE"
410 INPUT P$
420 IF LEN(P$)=0 THEN P$=L$
430 IF P$="END" THEN 2100
440 GOSUB 250:L$=P$
450 GOTO 400
500 GOSUB 900
510 GOSUB 920
520 PRINT"WHAT CHARACTER IS THIS?"
540 GOSUB 130
550 T$=INKEY$:IF T$="" THEN 550
560 IF ASC(T$)=21 THEN 2100
570 IF ASC(T$)=13 THEN 540
580 PRINT T$:IF T$=R$ THEN 620
590 PRINT"NO, IT WAS ";R$
600 PRINT"TRY IT AGAIN.":PRINT
610 GOTO 510
620 PRINT"RIGHT!":GOTO 500
700 PRINT"WHAT'S THIS?"
710 P$="":FOR J=1 TO N
720 GOSUB 900
730 P$=P$+P$:NEXT
735 FOR J=1 TO 400:NEXT
740 GOSUB 250:PRINT" ";
741 PRINT P$;
746 GOTO 710
750 INPUT T$:IF T$="" THEN 740
760 IF T$="END" THEN 2100
770 IF T$=P$ THEN PRINT"RIGHT!":GOTO 700
780 PRINT"NO, IT WAS ";P$
790 PRINT"LISTEN AGAIN."
800 GOTO 740
900 R=RND(52)-1
901 IF C$(R)="X" OR C$(R)="-.-.-" OR C$(R)=".-.-." THEN 900
910 R$=CHR$(R+39):RETURN
920 FOR J=1 TO 800:NEXT:RETURN
950 END
2000 CLEAR 360
2010 DIM C$(51)
2020 FOR J=0 TO 51:READ C$(J):NEXT
2030 P=176:T=5
2050 CLS:P$="HAM CODE"
2060 PRINT TAB(12);P$:PRINT
2070 GOSUB 250
2080 N=5:L$=CHR$(32)
2100 PRINT
2110 PRINT:PRINT"**OPTIONS**"
2120 PRINT"1  LEARN CHARACTERS"
2130 PRINT"2  LEARN PHRASES"
2140 PRINT"3  SINGLE CHARACTER QUIZ"
```

```
2150 PRINT"4  MULTI CHARACTER QUIZ"
2160 PRINT"5  END"
2190 PRINT"ENTER 1-5"
2200 PRINT
2210 R$=INKEY$:R=RND(J)
2220 IF LEN(R$)=0 THEN 2210
2230 R=VAL(R$):IF R<1 OR R>5 THEN 2210
2240 ON R GOTO 300,400,500,700,950
3010 DATA X,-.-.-.-.-.,X,X
3020 DATA X,X,X
3030 DATA X,-----.,----
3040 DATA ..---,...--,....-
3050 DATA .....-....,--...
3060 DATA ---..,----.,X
3070 DATA X,X,X,X,X,X
3080 DATA .-,-...,-.-.,-..,
3090 DATA ..-.,--.,.....,.---
3100 DATA -.-,.-..,--,-.,---
3110 DATA .--.,--.-,.-.,....,-
3120 DATA ..-,...-,.--,-..-
3130 DATA -.--,--..
```

Morse Program.

of Communications 10 WPM tape, but would not have one ready until the following week. Anyway, not to be defeated by the exam, I purchased a tape and proceeded to analyse it on a digital storage oscilloscope. Here are the results of the time periods which readers may want to use in their own computer programs:

DOC Standard 10 WPM

dot	130 mS
dash	320 mS
gap between dots and dashes	60 mS
gap between letters	460 mS
gap between words	1020 to 1120 mS (1040 mS typical)

The tone frequency of the DOC tape was 785 Hz with some second harmonic component. The frequency is not so important as the ear can readily adapt to changes in pitch without affecting the decoding of the characters. At first glance, the above durations seem too long to give 10 WPM, but apparently the reason for this is that statistically plain text does not make use of all letters of the alphabet with uniform frequency and those with the highest frequency have the least number of dots or dashes. For further information on this subject see *Did Morse get it right?* in *Wireless World,* August 1983. Also in the exam, numbers each count as two letters. Note too, that DOC quote their examination speed as consisting of 12 WPM characters spaced out to an effective 10.

There was no way to modify the program using the sound command.

The Morse characters, I discovered, were actually coming out at 19-20 WPM on my computer with excessive spacing between them. The computer dots and dashes are actually generated by the Micro Colour Basic command *Sound P,D* where P is the pitch and D is the duration. Both P and D are integers from one to 255. D=1 is used for a 75 mS dot and D=3 for a 225 mS dash, much shorter than the DOC's 10 WPM.

Unfortunately there was no way to modify the program using the *Sound* command (which comes out of the speaker of the monitor television) to make the periods the same as the DOC standard. However, I wrote a simple machine language program to output the dots and dashes of exactly the right durations from the serial in/out port of the computer. Although not as convenient as the television, the output is "cleaner" as the television audio output envelope tended to be rather "ragged." The serial output is then used to gate on and off a simple audio oscillator which is used to drive either headphones, speaker or tape recorder for recording practice sessions.

Although the MC10 is not a particularly common computer, the program is listed because the *Microsoft Basic* program will work on many computer types with slight modification to the delays, the machine language program is also listed separately to give the procedure used.

DESCRIPTION OF BASIC PROGRAM

The machine language program is poked into memory by lines 10 to 41, starting at a convenient address of 20000 given in line 9. Data lines are normally used for entering machine code but this method is already used in lines 3010 to 3130, for entering the dots and dashes look-up the table.

Lines 130 to 220 outputs character R$. Lines 250 to 290 outputs phrase P$. Lines 300 to 360 teach characters by echoing keys until "Control-Q" is pressed.

Lines 400 to 450 teach phrases by echoing entries until END is entered. Lines 500 to 620 quizzes individual characters until "Control-Q" is pressed. Lines 700 to 800 quizzes random five character phrases until END is entered. Lines 900 to 910 pick random character R$.

Line 190 gives the delay between dots and dashes, line 200 gives the delay between letters. Line 280 provides the delay between words in Option 2 and line 735 for Option 4. The numbers in these lines may be varied for other computers to obtain the correct delays on the storage CRO.

DESCRIPTION OF MACHINE LANGUAGE SUBROUTINE

The first task in adapting this to other computers is to find the address of the serial printer output. In my case, this was Bit0 of address 03. Next a table of the instruction codes for your particular computer's micro-processor is required. In my case, an MC6803 (which is the same as an MC6801 operating in Modes 2 or 3).

To output the start of a dot or dash, a "zero" is outputted to address 03 by the instructions *CLRA* (clear accumulator A) and ***STAA 03*** (store contents of accumulator A in address 03). To give the dot or dash the correct time period, a delay loop is used. A number (255) is loaded into accumulator B and decremented by one each time around the loop until it reaches zero. The decrementing, *DECB,* instruction takes two clock cycles of the micro-processor, a NOP or no-operation, takes two cycles and the branch, if not equal (BNE) takes three clock cycles. The "branch if not equal" in this case means equal to zero. A branch back to label CCC is four program steps giving the number 252, which is 256 minus four. Each clock cycle takes 1.124 uS because the micro-processor runs off a 0.89 MHz crystal. The *Delay* subroutine then gives a delay of 7*255*1.124 uS or 2.01 mS.

To get a dot the *Delay* subroutine is executed 65 times and for a dash 159 times. The *Delay* subroutine is executed each time *JSR Delay* is encountered (jump to subroutine). The address of *Delay* is 20032, which is given by the two Bytes of instruction code 78,64 in decimal. This is 4E,40 in hexadecimal and since E=14, corresponds to
4*4096+14*256+4*16+0*1 = 20032.

To end the dot or dash, bit0 of address 03 is put to a logic 1 by the instructions LDA #1, STAA 03. Note that a "1" output from the microprocessor turns off the tone in the

```
          MACHINE LANGUAGE SUBROUTINE.
-------------------------------------------------------------------
ADDRESS   INSTRUCTION.LABEL   MNEMONIC          COMMENT
          (in decimal)
-------------------------------------------------------------------
20000     79          DOT     CLRA
          151,3               STAA 03           OUTPUT START OF DOT

          134,65              LDA  #65
          189,78,64   DDD     JSR  DELAY        DELAY=65*2.01
          74                  DECA                   =130mS
          38,250              BNE  DDD

          134,1               LDA  #1
          151,3               STAA 03           END OF DOT
          57                  RTS

20016     79          DASH    CLRA
          151,3               STAA 03           OUTPUT START OF DASH

          134,159             LDA  #159
          189,78,64   EEE     JSR  DELAY        DELAY=159*2.01
          74                  DECA                   =320mS
          38,250              BNE  EEE

          134,1               LDA  #1
          151,3               STAA 03           END OF DASH
          57                  RTS

20032     198,255     DELAY   LDB  #255         DELAY=7*255*1.124uS
          90          CCC     DECB              2   (=2.01mS)
          1                   NOP               2
          38,252              BNE  CCC          3
          57                  RTS               7 CLOCK CYCLES.
```

Machine Language Subroutine.

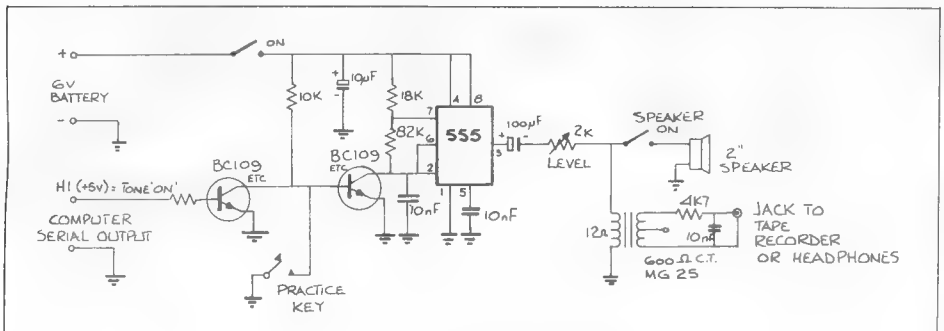

Figure 1 — The External oscillator.

external oscillator because there is an inverter driving the serial output inside the computer. The instruction *RTS* (return from subroutine) causes the program to go back to the Basic program after the dot or dash is complete. The Basic instruction *EXEC* in lines 160 and 161 cause the computer to execute the machine language instructions starting at the address given.

USING THE PROGRAM

I found that once the characters have been learned using Option 1, the main use of the program for practicing alone is Option 4. Here random five letter and number groups are sent. The television screen is covered up and the characters written down. After say 50 groups are copied, the program may be stopped by pressing *Break* and the written work corrected. Another useful feature is Option 2, where you can get your wife to type in four lines from a book, etc, and the message put on tape to provide new plain language practice material. I was limited to only four lines with 4k of memory. With more memory the number in line 2000 could be increased to give more string space. By typing "opening bracket, space" at the start of the message, and "closing bracket, space" at the end of the message, (and), the commencing signal dah-di-dah-di-dah and ending signal di-dah-di- dah-dit will be sent.

The external oscillator is something I threw together on a piece of matrix board. The 555 is wired as an astable oscillator. The transformer eliminates any possible earth hum loops for the tape recorder input. The current drain is about 3 mA on standby and 15 mA keyed.

On the subject of Morse examinations, I found the articles in previous *Amateur Radios* very useful. (*That terrible five minutes* April 1984, and *Pounding Brass* February 1984). Some differences I found sitting the exam in Melbourne (at Camberwell) is that for the receiving exam there are two long benches with the audio fed down each via a cable. There are junction boxes every couple of metres which you plug the headset into. You can take your own comfortable headset but it must have a standard quarter-inch mono plug. If you use a stereo plug you only get sound in one ear. It also pays to have all your height, weight, etc, information handy as this must be written on the front of the examination paper.

In conclusion, I can say that practicing on nothing else but the DOC standard speed and trying to get down to zero errors consistently, I found that the examination was no trouble with no characters being missed that I know of, which was a great improvement on my first attempt.

PUBLICATION OF COMPUTER PROGRAMS

Part of the technical editing of computer programs involves running the program. This has meant re-typing it from a listing supplied from the author. Many hours are spent by the editors entering the program, especially if, as does often occur, syntactical errors are introduced.

In future, to overcome this hold-up, alternative forms of program entry may be required; eg cassette, disk, or via a modem. This will enable quick editing. If we do require the program in one of these alternative forms, we will provide the blank cassette, disc, etc, or make the telephone call in the case of modems.

Finally, a word of advice. Computer programs on their own do not make good articles. Please include with any program a description of your algorithm. Articles are much more interesting when they include, not just a description of the **how** but also the **why**. Please use your blackest ribbon for your print-out.

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use your IBM PC/XT (or clone) for RTTY

Bryon Dunkley-Smith VK3YFL
17 Chesney Drive, Ringwood, Vic. 3134

Computers are becoming common-place in homes these days, particularly in the homes of amateur radio operators.

The IBM PC/XT has become an industry "standard" and with many other manufacturers producing low cost "clones" of these machines, this machine has been chosen by many for home use also.

Many communications software packages exist for the XT family, but most cater only for information transmission using the ASCII format with seven or eight data bits at speeds ranging upwards from 50 Baud. The "standard" for RTTY transmission in Australia is the Baudot code which uses five data bits at a speed of 45.45 Baud.

Therefore, in order to use the XT family for RTTY a specialty communications package has to be purchased or written by the user.

The accompanying program listed here is written in 8088 Assembly language and is designed to allow the XT to operate as a full duplex teleprinter utilising the main serial port. It is a simple program which does not include fancy features like split screens, type ahead facilities or automatic transmitter control, however, it is a program which may be used immediately or used as the basis of a program with more features. It does provide for the generation of hard copies by entering ^P to toggle the printer on and off as the ^P DOS command does and also automatic transmission of a CR/LF combination on entry of a ⟨RETURN⟩ from the keyboard or after the entry of 64 characters on a line, thus allowing typing of text to proceed continuously.

For those unfamiliar with Assembly language, the listing shown should be entered as a text file with the file name extension .ASM; eg RTTY.ASM using EDLIN, WORDSTAR (non-document mode) or your favourite text editor, and then assembled using ASM.EXE or MASM.EXE (as supplied on the DOS disk) to produce an object code file; eg RTTY.OBJ. This must then be processed by Link.EXE to produce the executable file; eg RTTY.EXE.

NOTE: Since completing this article the author has developed the program further to indicate split transmit and receive screens, together with a transmit "type ahead" buffer. As the source code is too long to reproduce in AR he would be happy to supply the code to readers who supply a disk together with return postage or by phoning (03) 876 2686 using Christensen Protocol at 300 Baud.

ar

```
STACK   SEGMENT STACK
        DW      64 DUP(?)
STACK   ENDS
SERIAL  EQU     03F8H
PRINTR  EQU     0378H
CODE    SEGMENT
RXFLAG  DB      0               ;Define RX FIGS/LTRS flag
TXFLAG  DB      0               ;Define TX FIGS/LTRS flag
PTFLAG  DB      0               ;Define printer flag
CURSOR  DB      1               ;Define cursor column pos'n
BUFFER  DB      256 DUP(0)      ;Define print buffer
PNT1    DB      0               ;Define buffer print pos'n
PNT2    DB      0               ;Define buffer input pos'n
MSG     DB      25 DUP(10)
        DB      '                45.45 baud RTTY Baudot routine enabled',10,13,1
0,10,10
        DB      '               Code written by Bryon Dunkley-Smith (VK3YFL)',10,1
3,10,10,10
        DB      '                    Press  ESC  to return to DOS',10,13,10,10
        DB      '                  Press  P to toggle printer on/off',10,13,10,1
0,'$'
        ASSUME  CS:CODE,DS:CODE
RTTY    PROC    FAR
        PUSH    DS              ;Save segment of PSP
        MOV     AX,0
        PUSH    AX              ;Save offset of 0 on stack
        MOV     AX,CS
        MOV     DS,AX
        MOV     DX,SERIAL+3     ;Control register
        MOV     AL,80H
        OUT     DX,AL           ;Set up for divisor
        MOV     AX,2533         ;Divisor for 45.45 baud
        MOV     DX,SERIAL
        OUT     DX,AL           ;Low order of divisor
        MOV     AL,AH
        INC     DX
        OUT     DX,AL           ;High order of divisor
        MOV     DX,SERIAL+3     ;Control register
        MOV     AL,00000100B    ;Sets no parity, 2 stop & 5 data bits
        OUT     DX,AL
        MOV     AH,9            ;Set up to display message
        MOV     DX,OFFSET MSG
        INT     21H
NOCHAR: MOV     AH,1            ;Test keyboard
        INT     16H             ; status
        JNZ     LBL1
        JMP     NOKEY           ;Jump if no key depressed
LBL1:   MOV     AH,0            ;Input char
        INT     16H             ; from keyboard
        CMP     AL,1BH          ;Check for ESC
        JNZ     NOEXIT
        RET                     ; and return to DOS
NOEXIT: CMP     AL,0DH          ;Check for CR
        JNZ     NOCR            ; and jump
        CALL    CRLF            ;Send and display CR/LF
        JMP     NOKEY
NOCR:   CMP     AL,10H          ;Test for ^P
        JNZ     NOCTLP          ; no   jump
        ADD     PTFLAG,1        ; yes - toggle flag
        JMP     NOKEY
NOCTLP: CALL    VIDEO           ;Display char on screen
        INC     CURSOR          ;Increment cursor position
        CMP     CURSOR,64       ;Check if cursor OK
        JLE     CUROK           ;Jump if OK
        CALL    CRLF            ;Send and display CR/LF
CUROK:  MOV     BX,OFFSET TABLE1
        XLAT    TABLE1          ;ASCII to Baudot
        TEST    AL,40H          ;Test for FIGS or LTRS
        JZ      LTRS1           ;FIGS Z=0,LTRS Z-1
FIGS:   PUSH    AX              ;Save  char
        MOV     AL,1
        JMP     COMP            ;Jump to compare with previous shift
LTRS1:  PUSH    AX              ;Save char
        MOV     AL,0
COMP:   MOV     AH,TXFLAG       ;Load with previous shift
        CMP     AH,AL           ; and compare with new shift
        JZ      NSHIFT          ;Jump to NSHIFT if AL=TXFLAG
        MOV     AH,0
        CMP     AH,AL           ;Test for LTRS
        JZ      LTRS2           ;Jump if LTRS
        MOV     AL,1BH          ;Send
        CALL    SEND            ; FIGS shift
        MOV     TXFLAG,1        ;Set TXFLAG for FIGS
        JMP     NSHIFT
LTRS2:  MOV     AL,1FH          ;Send
        CALL    SEND            ; LTRS shift
        MOV     TXFLAG,0        ;Set TXFLAG for FIGS
NSHIFT: POP     AX              ;Restore char
        CALL    SEND            ;Send char
NOKEY:  MOV     DX,SERIAL+5     ;Test
        IN      AL,DX           ; for
        TEST    AL,01H          ; char
        JNZ     LBL2
        JMP     PRINT           ;Jump if no char
LBL2:   MOV     DX,SERIAL       ;Get
        IN      AL,DX           ; char
        CMP     AL,1BH          ;Compare with FIGS shift
        JNZ     LTRSO           ;Jump if not FIGS shift
        MOV     RXFLAG,1        ;Set RXFLAG for FIGS shift
        JMP     NOKEY
LTRSO:  CMP     AL,1FH          ;Compare with LTRS shift
        JNZ     CONV            ;Jump if not LTRS shift
        MOV     RXFLAG,0        ;Set RXFLAG for LTRS shift
        JMP     NOKEY
CONV:   ADD     AL,AL           ;Double char
        ADD     AL,RXFLAG       ;Set for FIGS or LTRS
        MOV     BX,OFFSET TABLE2
        XLAT    TABLE2          ;Baudot to ASCII
        CALL    VIDEO           ;Display char
PRINT:  MOV     AL,PNT1         ;Load buffer print pos'n
        MOV     AH,PNT2         ;Load buffer input pos'n
        CMP     AL,AH           ;Check if current
        JE      PASS            ; and pass if so
        MOV     BX,OFFSET BUFFER;Point to print buffer
        XLAT    BUFFER          ;Fetch char from buffer
        MOV     DX,PRINTR       ;Data output port
        OUT     DX,AL           ;Put char in output port
        INC     DX              ;Status port address
        IN      AL,DX           ;Get printer status
        TEST    AL,80H          ;Test the busy bit
        JZ      PASS            ; and pass if busy
        INC     DX              ;Point to control port
        MOV     AL,0DH          ;Control value for strobe high
        OUT     DX,AL
        MOV     AL,0CH          ;Control value for strobe low
        OUT     DX,AL
        ADD     PNT1,1          ;Bump to next buffer loc'n
PASS:   JMP     NOCHAR          ;Check for TX char
RTTY    ENDP
```

```
TABLE1  DB      00H,00H,00H,00H,00H,00H,00H,00H,00H,00H,02H,00H
        DB      00H,08H,00H,00H,00H,00H,00H,00H,00H,00H,00H,00H
        DB      00H,00H,00H,00H,00H,00H,00H,00H,04H,00H,45H,00H
        DB      54H,4DH,00H,45H,4FH,52H,00H,51H,4CH,43H,5CH,5DH
        DB      56H,57H,53H,41H,4AH,50H,55H,47H,46H,58H,4EH,00H
        DB      00H,5EH,00H,59H,5AH,03H,19H,0EH,09H,01H,0DH,1AH
        DB      14H,06H,0BH,0FH,12H,1CH,0CH,18H,16H,17H,0AH,05H
        DB      10H,07H,1EH,13H,1DH,15H,11H,4FH,5DH,52H,00H,43H
        DB      00H,03H,19H,0EH,09H,01H,0DH,1AH,14H,06H,0BH,0FH
        DB      12H,1CH,0CH,18H,16H,17H,0AH,05H,10H,07H,1EH,13H
        DB      1DH,15H,11H,4FH,4EH,52H,00H,00H
TABLE2  DB      0,0,'E','3',10,10,'A','-',' ',' ','S','"'
        DB      'I','8','U','7',13,13,'D','+','R','4','J',7
        DB      'N',',','F',0,'C',':','K','(','T','5','Z','+'
        DB      'L',')','W','2','H','/','Y','6','P','0','Q','1'
        DB      'O','9','B','?','G','-',0,0,'M','.','X','/'
        DB      'V','=',0,0
VIDEO   PROC    NEAR            ;Video display sub-routine
        CALL    PBUFF           ;Jump to printer sub-routine
        MOV     AH,14           ;Display
        MOV     DX,0            ; char
        MOV     BX,0            ; in AL
        INT     10H             ; on screen
        RET
VIDEO   ENDP
SEND    PROC    NEAR            ;RS232 Send sub-routine
        PUSH    AX              ;Save char
        MOV     DX,SERIAL+5     ;Test
LBL3:   IN      AL,DX           ; TX buffer
        TEST    AL,20H          ; for empty
        JZ      LBL3
        POP     AX              ;Restore char
        MOV     DX,SERIAL
        OUT     DX,AL           ;Send char
        RET
SEND    ENDP
PBUFF   PROC    NEAR            ;Printer buffer subroutine
        TEST    PTFLAG,1        ;Printer flag set
        JZ      RETN            ; no - jump to return
        MOV     BH,0
        MOV     BL,PNT2
        ADD     BX,OFFSET BUFFER;Point to buffer loc'n
        MOV     [BX],AL         ;Store char in buffer
        ADD     PNT2,1          ;Bump to next buffer loc'n
RETN:   RET
PBUFF   ENDP
CRLF    PROC    NEAR            ;CR/LF sub-routine
        PUSH    AX              ;Save char
        MOV     AL,08H          ;Send
        CALL    SEND            ; CR
        MOV     AL,0CH          ;Send
        CALL    SEND            ; LF
        MOV     CURSOR,1        ;Reset cursor po
        MOV     AL,0DH          ;Display
        CALL    VIDEO           ; CR
        MOV     AL,0AH          ;Display
        CALL    VIDEO           ; LF
        POP     AX              ;Restore char
        RET
CRLF    ENDP
CODE    ENDS
        END     RTTY
```

HOW WILL AMSAT PHASE IIIC ACHIEVE ITS ORBIT?

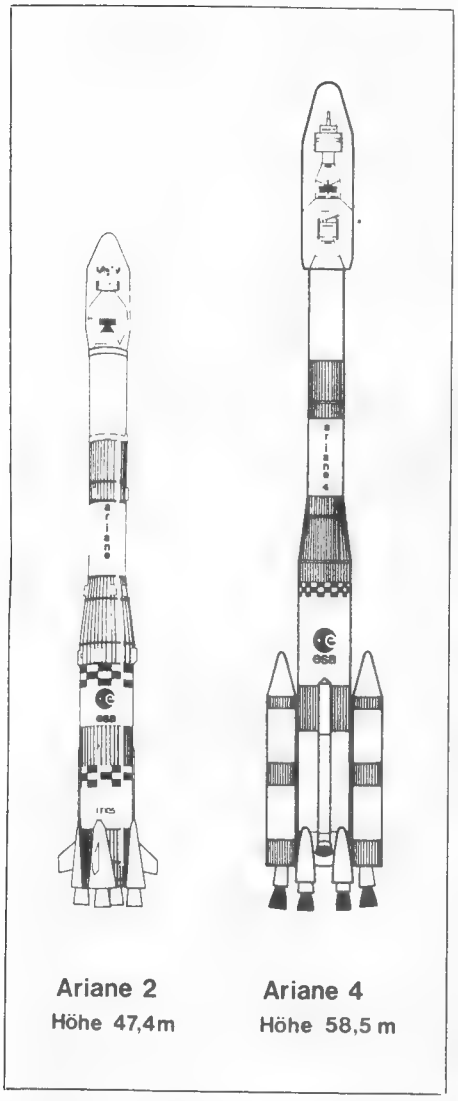


Figure 1 — Ariane 2 is 47.4 metres tall compared to Ariane 4 which is 58.5 metres.

Now that OSCAR-10 has functioned so reliably for two-and- a-half-years, another satellite launch *DL-SAT Phase 3C* is expected in Autumn 1986 (Spring 1986 in VK). This satellite is an improved follow-up version and is being constructed with substantial financial assistance by the Deutscher Amateur Radio Club (DARC) DM 250 000, and the West German Federal Ministry for Research and Technology DM 750 000.

OSCAR-10 was launched in June 1983 with an Ariane-2 rocket but the launching of DL-SAT Phase 3C is planned with a new European-Rocket Ariane-4 (see Figure 1). Ariane-4 is 11 metres taller than Ariane-2, and can carry a 4.2 ton payload to a sun synchronous 800 km high orbit. This is being achieved with four additional rocket motors (two using solid fuel and two using liquid).

Three payloads are planned for the October/November (?) 1986 launch. One further METEOSAT, a PANAMSAT (American Communications Satellite) and the Amateur Radio Satellite, Phase 3C. Figure 2 shows the separation sequence of the various payloads. Picture 6 of Figure 2 shows the cylinder X, which holds the DL-SAT Phase 3C. The actual size can be seen in Figures 3 and 4.

The cylinder X, with Phase 3C is an independent unit after separation. Since the satellite will be ejected later, a separation sequencer was required, which was developed and supplied by AMSAT-DL. This sequencer is attached to the cylinder X and not to the satellite. The timing of the sequencer commences after the separation of the cylinder X from the transport container (level W). The ignition of the separating bolts — holding the clamping belt — takes place 3600 seconds later. Phase 3C is then ejected from cylinder X by three springs on the clamping belt.

Next, the magnetic satellite orientation system within the satellite places it in the correct position (Magnet-Earth acts as reference), and the 400 Newton rocket motor of the satellite is ignited (see

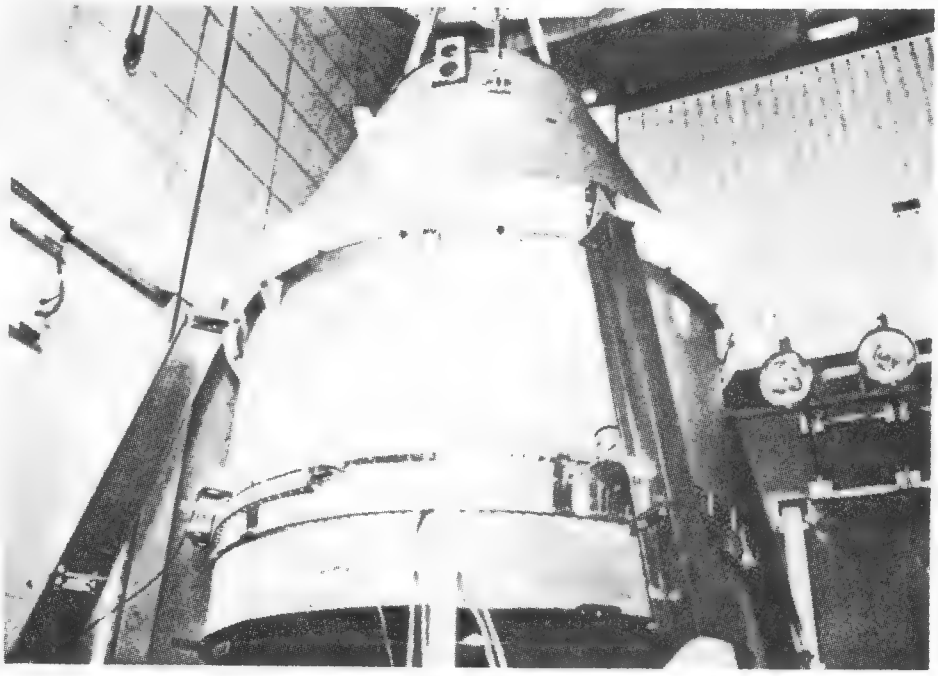


Figure 3.

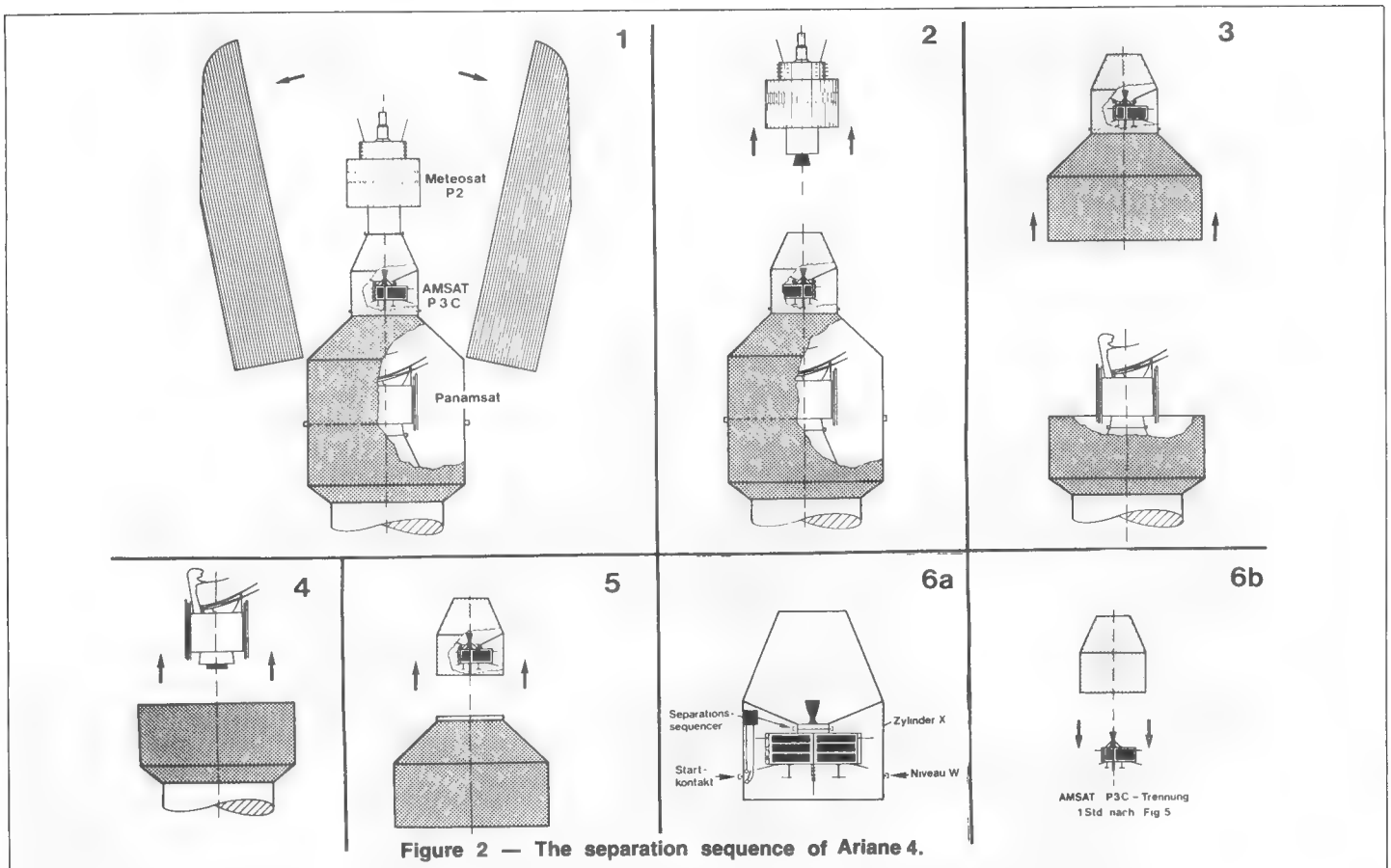
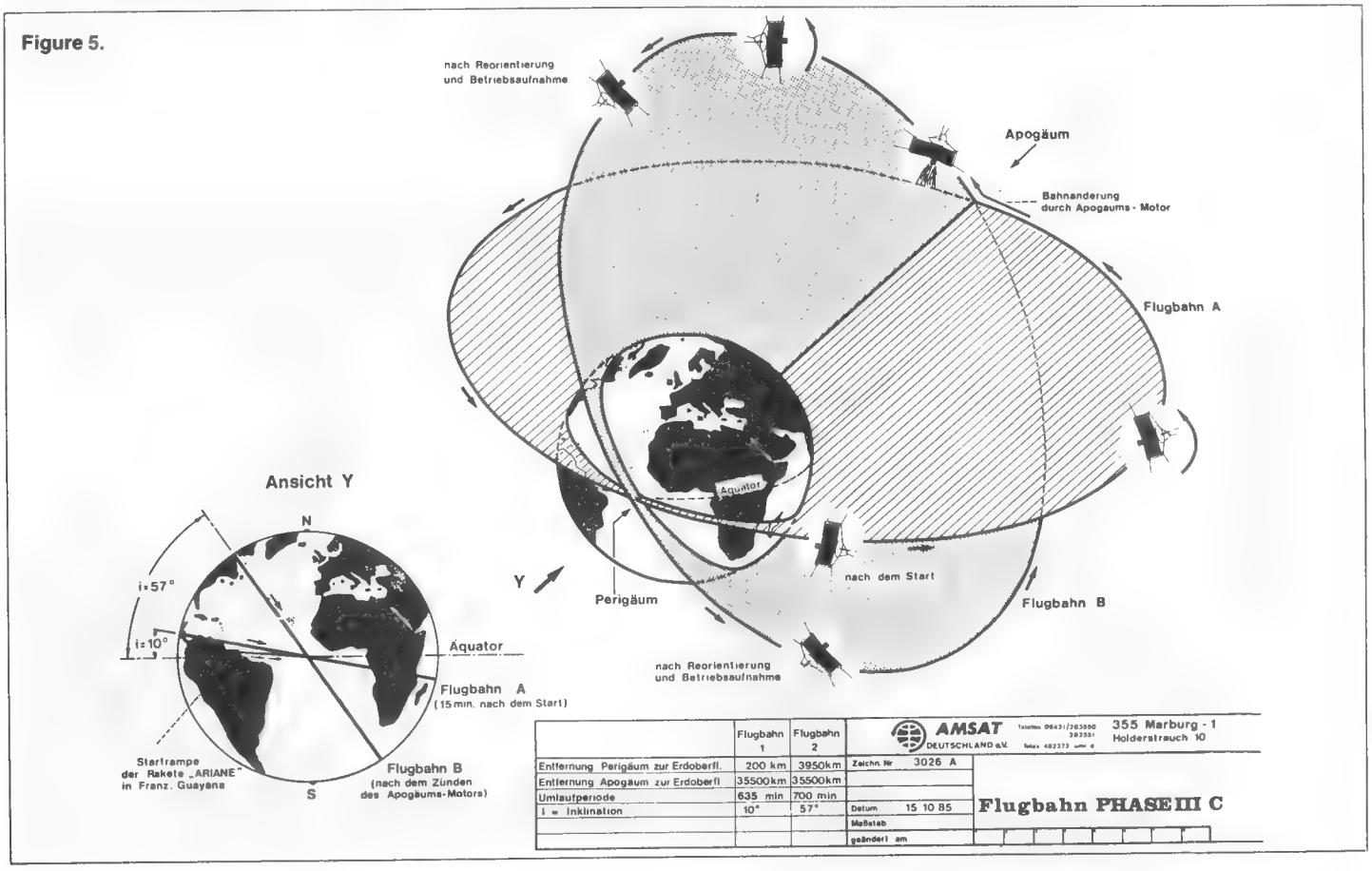


Figure 2 — The separation sequence of Ariane 4.

Figure 5.



	Flugbahn 1	Flugbahn 2
Entfernung Perigäum zur Erdoberfl.	200 km	3950 km
Entfernung Apogäum zur Erdoberfl.	35500 km	35500 km
Umlaufperiode	635 min	700 min
i = Inklination	10°	57°

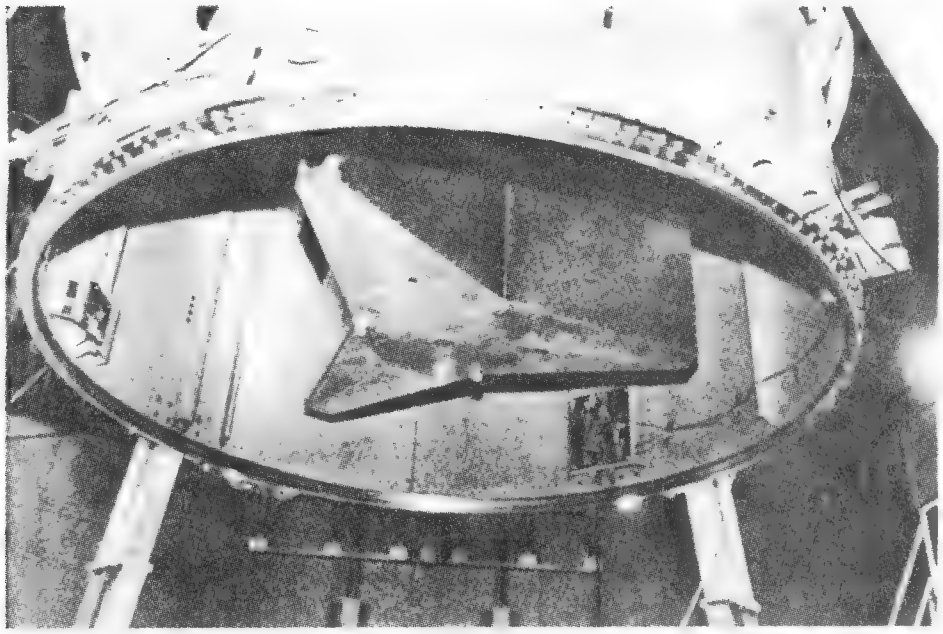


Figure 4.

Figure 5).

This operation changes the inclination of the satellite orbit to the equator and lifts the perigee (point of closest approach to earth).

An inclination of 57 degrees is desired because the majority of users live in the Northern Hemisphere. (This means less than five degrees antenna elevation for VK2 to Europe QSOs).

Also, the argument of the perigee changes little at 57 degrees inclination, resulting in a nearly unchanging satellite orbit over a long period of time. The transponders will be made operational after the re-orientation phase (to point the antennas towards earth).

This project will give amateur radio further possibilities of making world- wide contacts via satellite. The RUDAK-Project offers new interesting scope for conducting digital communication (packet radio) via satellite and to gain valuable experience with a new operation technique.

Reprinted from *CQ-DL*, March 1986. The original article was written by Werner Haas DJ5FQ and translated for *Amateur Radio* by Hans Ruckert VK2AOU

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An Antenna Length Chart

Here is a clip-and-save chart that will save you lots of time while helping you to put up a variety of antennas. This article originally appeared in CQ Magazine, March 1986 and was written by George I Wagner K5KG.

In the past few years I have had several opportunities to operate from a number of DX locations. In doing so, I have learned the importance of taking along the proper collection of tools, connectors, gadgets, and reference information to be able to make a quick repair or string up a needed antenna in an unfamiliar shack. Conversely, I have also learned the agony of lugging too much along, only to find it completely unnecessary and unused at the end of the trip.

The antenna length chart, which is the subject of this article, arose out of the need to have a convenient and ready reference, other than a weighty handbook, for measuring antenna lengths. This results from a number of experiences in trying to find a calculator, or a paper and pencil (typically in the dark and late at night), inevitable debates over what constants to use in the calculations, and finally the need to convert from feet to metres when only a metre tape was available, or vice versa. On two separate occasions I have discovered 160 metre dipoles of totally wrong lengths, and on an expedition to OJ0 in 1982, OH0RJ and I spent many hours calculating, cutting, and erecting 40 and 15 metre delta loops. This chart would have been a valuable asset in those circumstances.

This chart was developed after a brief reference to the various antenna handbooks in the shack, and a quick refresher on the current amateur frequencies, especially in the new 12, 15, and 30 metre WARC bands. The formulas used in the calculations, shown at the bottom of the chart, are based upon standard assumptions for wire antennas supported by end insulators.

The chart was developed using *Visicalc* (a registered trademark of *VisiCorp*), an electronic *spreadsheet* program on an *Apple II+* computer. However, any spreadsheet program on a personal computer could have been used to do the job

It is not necessary to go into the details of using the spreadsheet program. I will point out, however, to those unfamiliar with such programs, that they provide a convenient way to manage rows and columns of numbers and text, and for performing rapid arithmetic calculations on the numbers. In this chart, for example, once the formulas and frequencies were input, the antenna lengths were quickly calculated for each of the eight columns. The first version of the chart did not include the new WARC bands. Once I realised this omission, it was quite easy with the spreadsheet program to insert the additional frequencies and recalculate the entire chart.

For the benefit of those new to amateur radio, the chart shows the proper wire lengths for antennas at each significant amateur frequency in the HF bands. In general, vertical antennas are ¼ wavelength high, dipoles are ½ wavelength long, and loops are one full wavelength in circumference. In addition, the chart shows the ½ wavelength plus five percent distance. This is used to find the length of a dipole erected in an inverted-Vee fashion.

For convenience and durability, I have had a copy of the chart laminated in plastic. The chart printed in this article can similarly be cut out and laminated.

ar

ANTENNA LENGTH CHART

FREQUENCY	WAVELENGTH — FEET				WAVELENGTH — METRES			
MHz	¼	½	½ + 5%	FULL	¼	½	½ + 5%	FULL
1.8	129.87	259.75	272.73	519.49	39.58	79.17	83.12	158.33
1.825	128.09	256.19	269.00	512.38	39.04	78.08	81.99	156.16
1.85	126.36	252.73	265.36	505.45	38.51	77.03	80.88	154.05
1.9	123.04	246.08	258.38	492.15	37.50	75.00	78.75	150.00
3.5	66.79	133.58	140.26	267.17	20.36	40.71	42.75	81.43
3.6	64.94	129.87	136.37	259.75	19.79	39.58	41.56	79.17
3.7	63.18	126.36	132.68	252.73	19.26	38.51	40.44	77.03
3.8	61.52	123.04	129.19	246.08	18.75	37.50	39.38	75.00
3.9	59.94	119.88	125.88	239.77	18.27	36.54	38.37	73.08
4	58.44	116.89	122.73	233.77	17.81	35.63	37.41	71.25
7	33.40	66.79	70.13	133.58	10.18	20.36	21.37	40.71
7.05	33.16	66.32	69.63	132.64	10.11	20.21	21.22	40.43
7.1	32.93	65.85	69.14	131.70	10.04	20.07	21.07	40.14
7.2	32.47	64.94	68.18	129.87	9.90	19.79	20.78	39.58
7.3	32.02	64.05	67.25	128.09	9.76	19.52	20.50	39.04
10	23.38	46.75	49.09	93.51	7.13	14.25	14.96	28.50
10.5	22.26	44.53	46.75	89.06	6.79	13.57	14.25	27.14
14	16.70	33.40	35.07	66.79	5.09	10.18	10.69	20.36
14.1	16.58	33.16	34.82	66.32	5.05	10.11	10.61	20.21
14.2	16.46	32.93	34.57	65.85	5.02	10.04	10.54	20.07
14.35	16.29	32.58	34.21	65.16	4.97	9.93	10.43	19.86
18	12.99	25.97	27.27	51.95	3.96	7.92	8.31	15.83
18.5	12.64	25.27	26.54	50.55	3.85	7.70	8.09	15.41
21	11.13	22.26	23.38	44.53	3.39	6.79	7.12	13.57
21.1	11.08	22.16	23.27	44.32	3.38	6.75	7.09	13.51
21.25	11.00	22.00	23.10	44.00	3.35	6.71	7.04	13.41
21.45	10.90	21.80	22.89	43.59	3.32	6.64	6.98	13.29
24.89	9.39	18.78	19.72	37.57	2.86	5.73	6.01	11.45
24.93	9.38	18.75	19.69	37.51	2.86	5.72	6.00	11.43
24.99	9.35	18.71	19.64	37.42	2.85	5.70	5.99	11.40
28	8.35	16.70	17.53	33.40	2.54	5.09	5.34	10.18
28.5	8.20	16.41	17.23	32.81	2.50	5.00	5.25	10.00
29	8.06	16.12	16.93	32.24	2.46	4.91	5.16	9.83

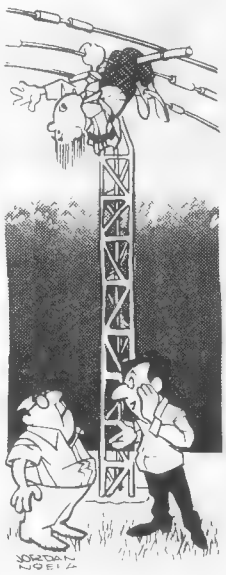
FORMULAS USED

1 metre = 3.281 feet

Length of ½ wavelength antenna in metres =
*(300 * .95 * .5)/ Frequency (MHz) = 142.50/Frequency (MHz)*

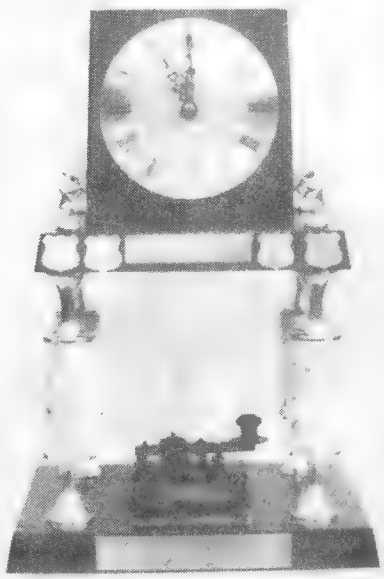
Length of ½ wavelength antenna in feet =
*(300 * .95 * .5 * 3.281m/feet)/ Frequency (MHz) = 467.54/Frequency (MHz)*

NOTE: ½ wavelength + 5% is used for Inverted Vee Antennas.



Cartoon courtesy *73 for Radio Amateurs*, March 1986

I'd help Ralph get down, but he's giving me a 1:1 SWR!



The Mrs McKenzie Trophy — see page 38 for the 1986 ALARA Contest rules.

1926 TRANS PACIFIC TESTS

During 1926, the WIA in Australia and the ARRL in America attempted to encourage interest between amateurs from both continents to see who could hear what and on which band. Following is the text of a letter written on a WIA letter-head by Ross Hull as Honorary Federal Secretary of the WIA, and also the information he supplied for amateurs.

Dear OM,

I am sending you the details of the big Trans Pacific tests which are being staged between May 23 and June 5. These tests will be the result of a long period of careful organising work with the American Radio Relay League, and I trust that you will do your part in showing the Americans that if no one else can be depended upon to co-operate with them in running a big test, the Australians certainly can.

When you have looked through the schedule I want you to send a card or radio to to the address above, stating the divisions of the tests in which you intend to be actively interested. On receipt of this information the necessary log sheets will be forwarded to you. In the case of transmitters entering in test A an official test message of 500 words will be forwarded in addition.

If you cannot take an active part in the tests, I would still like to have a card from you. The Federal Executive is anxious to know just how many transmitters are unable to take part in the test through stress of circumstances, and how many of them have died out from want of enthusiasm.

Yours sincerely,
Ross A Hull,
Hon Federal Secretary.

The Wireless Institute of Australia asks for your participation in what they hope will be the biggest organised amateur tests yet undertaken in any part of the world.

The Institute feels confident that the tests will have the full support of all real Australian experimenters, for it is in this work that they must demonstrate to the world at large the fact that they have not by any means been asleep during the three odd years that have elapsed since signals were first received from America.

What is perhaps more important is that the American amateurs in their enthusiastic old way are looking to the Australians to help them put up the finest performance that has yet been accomplished on this earth.

Just in case it may be thought in some quarters that there is no justification for the tests the chief aims and objects are outlined:

1. To demonstrate to the world at large the advanced stage of present day amateur radio communication.
2. To provide a much needed stimulus in amateur circles.
3. To drive home in the amateur world the existence of a pile of experimental work yet undone.
4. To discover the most reliable and effective amateur station in each of the Australian and American States.
5. To definitely establish the hours during which reliable communication can be maintained across the Pacific.
6. To provide further observations on the relative effectiveness of 20 and 40 metre bands for Trans Pacific working.
7. To stimulate interest in observations on waves as low as five metres.
8. To fill the air with signals of all shapes and sizes in order to show the short wave world that if no one else is alive the Australian amateurs are. (The latter point is being questioned in many quarters).

TEST A

Aim — To discover the most reliable and effective amateur station in each of the Australian and American States. Further, to provide a qualifying test for stations desirous of obtaining the Wireless Institute's "A grade amateur station" certificate.

Schedule — May 22 at 6 pm to June 5 at 6 pm.

1. Stations desiring to participate, upon applying to the Test Headquarters, will be provided with a passage of 500 words which must be transmitted to any station in America sometime during the total period of the tests.
2. An accurate log must be taken on the forms provided for the purpose of the transmissions necessary to send the test passage. The dates and exact times must be stated together with details of any repeats necessary and a statement whether single or double sending was used.
3. The full details of power used in the transmission must be included. Approximate plate potential and current, together with details of the valves used.
4. If it is desired to obtain an "A grade amateur receiving and transmitting station" certificate or if it is desired to compete in the competition of this test, it will also be necessary to take an official 500 word test message from some American amateur station. The American station need not necessarily be the one to which the test message was transmitted.
5. Details of such reception must then be included on the log sheet together with a brief description of the receiver.
6. Stations not operating transmitters can forward a receiving log only. The reception of any one test message from America with an accuracy above 75 percent will entitle the operator to an Institute "A grade amateur receiving station."
7. All such logs and details must be forwarded to the test Headquarters before June 10.

It is hoped that a trophy will be awarded by each State Division of the Institute to the station whose performance is adjudged the best from all aspects amongst the stations in that particular state. The Federal Executive of the Institute will also award a trophy to the station making the best performance of all Australian participants.

8. The factors to be taken into consideration in judging this test will be:— The total time taken to transmit the message and the method and speed of keying, the power of the transmitter, the location of the station and all other information supplied by the station participating.
9. As in all activities of the tests the general working of the Australian stations will be listened to by several official observation stations.

TEST B

Aim — To establish definitely the hours during which reliable amateur communication can be maintained across the Pacific. Further, to gain detailed information as to the relative effectiveness of the 20 and 40 metre bands for Trans Pacific working.

Schedule — May 28 at 6 pm to May 29 at 6 pm; also June 4 at 6 pm to June 5 at 6 pm.

1. In order to accomplish something useful in this test it will be necessary for Australian and American stations on both 40 and 20 metre bands to be on the air during the whole 24 hours.
2. It will be very essential for more Australian transmitting stations to tune down to 20 metres than have done so to date, before any useful comparison work can be accomplished.
3. Arrangements will be left in the hands of the Federal Delegate of the Institute in your State to provide for at least one station on 20 and one on 35 metres to be on the air during the 24 hours. In addition to signifying your intention of interesting yourself in this particular test to Headquarters, you should therefore get into touch with the Federal Delegate in your State, who will arrange with you for your schedule.
4. If no transmitters can be on watch over the whole periods it is desirable that at least receiving stations be on the look out for American stations.
5. A report of any comparison work between signals on the 20 and 40 metre bands by any individual, during any time of these tests, is almost certain to be of value and will therefore be welcomed.
6. All logs of this particular phase of the tests should be posted to headquarters before June 10, in order that the summary of observations can be gathered from all reports and mailed to America without delay.

TEST C

Aim — To stimulate interest in observations on waves as low as five metres.

Schedules — May 26 from 6 pm to 10 pm; also June 2 same times.

A plea has been made by the ARRL for the greatest possible activity in America on wave lengths of the order of five metres during the time mentioned. The Institute is making the same plea in Australia and it can only be suggested that any experimenters with transmitters or receivers operating on approximately the wave length mentioned, should see that their stations are not inactive during the above periods. Should any positive results be achieved, even in working over short distances with other Australians engaged in calling America, full details of the working should be forwarded to Headquarters so that credit for any work can be correctly placed.

TEST D

Aim — To discover the Australian amateur station that can correspond with an American amateur station on three separate nights of the test period with the minimum total input power.

Schedules — Any three or more nights during the test period.

This "Miles per Watt" test is to be run on similar lines to the competition of that name at present in progress in America and being handled by the ARRL in conjunction with the Jewell Electrical Instrument Co.

The Australian representatives of the Jewell Company have donated a prize of a Solid Gold Fifteen Jewel Watch to be awarded to the amateur operator whose station establishes communication as mentioned above with the lowest total input power.

Complete details of the rules governing this competition are contained in a circular prepared by the Jewell representatives. This can be obtained by writing to Headquarters.

If you have any sort of a short wave receiving or transmitting station in operation send along your name and address on a sheet of paper with the numbers of the tests you will be particularly interested in, and complete log sheets and details will be sent.

All communications to be addressed to:

ROSS A HULL
Hon Federal Secretary
Wireless Institute of Australia. Box 3120P, GPO
Sydney.

Contributed by Duane Foster VK2VE and Tim Mills VK2ZTM

The culminating occasion of these tests was the passing of 500 word messages in CW between the Australian and American stations. Those doing it successfully (over-heating of the "slop jar" power supplies was one problem), were awarded a fine certificate of about A4 size, which was signed by Hiram Percy Maxim, Phil Renshaw and the secretaries of the ARRL and WIA.

Do any Old Timers have any further information about these tests and particularly a list of participants?

Contributed by Dave Gray VK2IJ
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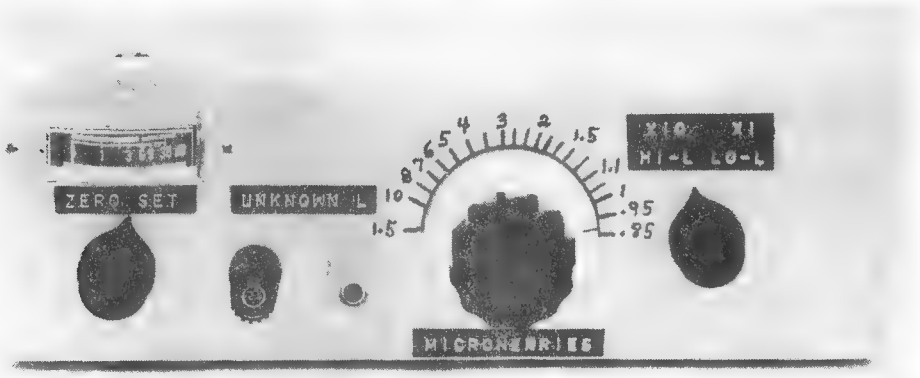
A TESTER FOR COIL INDUCTANCE

Laboratory-grade L and Q meters cost thousands of dollars. Let's build an inexpensive L and relative-Q measuring unit for our amateur workshop.



How often have you been uncertain about the inductance of a home-made coil? There are times when we aren't sure of the core material we select from our parts supply — the cores *do* become mixed up on occasion and leave unanswered a question about the core permeability. Maybe we don't trust the A_L factor when winding a toroid and would feel more confident if we could measure the inductance of the completed coil. Those of you who are fortunate enough to have access to a Q meter need not worry about building a home-made test unit. But, for those frugal souls, like the writer, who can ill-afford $250 for an old, used Q meter, or a few thousand for a new Q and L tester, we can build a satisfactory unit for a few dollars.

Many of us have used alternative inductance-measuring methods since becoming amateurs. This entailed using fairly crude techniques, such as placing a known-value capacitor in parallel with an unknown inductance, then using a dip meter to find the resonant frequency. The two known factors could then be used to learn the inductance value by using the appropriate equations. Approximations were possible with these methods. But, many of our projects call for fairly precise inductance values, especially in fixed-tuned RF filters. So, we really need an instrument that can be used for measuring inductance directly. This eliminates time-consuming follow-up calculations or monitoring the dip-meter operating frequency with a calibrated general- coverage receiver.

CIRCUIT COMMENTARY

Figure 1 contains a schematic diagram that shows the circuit for our project. Provisions are made for two popular inductance ranges — 1-10 μH, and 10-100 μH. More ranges can be added. This is discussed later in the article.

Two oscillators are used in Figure 1. One operates on 2.5 MHz (10-100 μH range), and the other is on 7.9 MHz (1-10 μH range). C2 and C9 are critical values for establishing the proper amount of oscillator feedback. The X_C of these capacitors is 150 ohms. Tuned transformers are used at the collectors of Q1 and Q2. Each transformer is terminated by a 56-ohm resistor to provide a fixed oscillator load. Fundamental crystals are used at Y1 and Y2.

Operating voltage and the RF output for the oscillators is selected by range switch S1. RF voltage is routed to C6 (main tuning), J1 and J2 through a 6.8- pF coupling capacitor. This light coupling prevents the transformer secondary windings and load resistors from loading the coil under test, which could ruin the Q_U (unloaded Q) of the coil under test. This would cause low, broad- response meter readings. Light coupling (C8) is used between C6, J1 and J2 for routing the RF voltage to meter amplifier Q3. This helps to preserve the Q_U of the coil being tested.

A 2N4416 (Q3) serves as our meter amplifier. The word "amplifier" is a misnomer, since M1 indicates changes in FET current as the test coil is tuned to resonance by C6. As the tuning capacitor is adjusted for circuit resonance, the RF voltage at the gate of Q3 rises, and this increases the FET current. So perhaps a more descriptive name for the Q3 stage would be "current multiplier." By this I mean, we are *not* amplifying the RF-input signal.

A 10-megohm gate resistor is used at Q3 to help maintain the high gate impedance of the FET. For example, if we used a 0.1-megohm gate resistor, this would set the actual gate impedance at 0.1 megohm, and that would tend to load the test coil.

R1 sets the meter sensitivity, and R2 is adjusted to zero the meter when there is no coil connected to J1 and J2. It is likely that an MPF102 JFET could be used at Q3. I used a 2N4416 because I had some of them on hand, and did not wish to make a 100 km round trip to buy an MPF102 at the nearest radio store!

HARMONIC TRAPS ARE NEEDED

An interesting problem arose while I was testing the circuit of Figure 1: Two peak responses were observed on each range. One peak proved to be the desired one, and the spurious peak response took place when C6 was moved toward minimum capacitance. Investigation with my dip meter (wave-meter mode), when it was coupled to the test coil, showed a strong response at the second harmonic of each oscillator — 5 and 15.8 MHz! The test coil was being tuned to the second harmonic, which enhanced the harmonic currents present in each oscillator. The simple cure is to install a series-tuned trap at the secondary winding of T1 and T2 (L1, L2, C3 and C5). Alternatively, a half- wave, low-pass filter can be connected between the transformer secondary and C7 of Figure 1.

ADDITIONAL INDUCTANCE RANGES

We may add a tester range for 0.1 to 1.0 μH by including a third oscillator for 25-MHz operation. A suitable circuit is provided in Figure 2. An overtone type of oscillator is required, since fundamental crystals are not available for frequencies much above 20 MHz, Y1 of Figure 2 is a third-overtone crystal. A 50-MHz trap is used at the output side of T1. I tested the circuit of Figure 1 for use in this range by tuning the 7.9-MHz oscillator for third-overtone operation, and the results were good.

If you wish to cover the inductance range from 100 μH to 1 mH, you may include a fourth oscillator. It operates on 790 kHz. The circuit is given in Figure 3. This is a fundamental oscillator. The selectivity of T1 may be high enough at this frequency to preclude the use of a harmonic trap. I did not perform a test to determine if a trap was needed.

CONSTRUCTION NOTES

You may prefer to plan your own layout for the tester. The important matter is to keep the leads between the oscillator transformers (T1 and T2) and C7 as short as possible. Otherwise, use miniature RG-174 cable for the connecting leads. Similarly, the lead from C7 to C6 and J1 must be short. Again, keep the lead from C8 to Q3 short.

Figure 4 shows an interior view of my prototype unit. It reflects the "ugly construction" philosophy. Things were tacked together hurriedly in order to get the circuit operating. A finished model is planned.

The foundation for my tester is made from PC-board material. Double-sided PC stock was used for all but the front panel, which is made from single-sided board. The latter material was chosen to permit writing on the panel with an indelible marking pen. The copper around J1 of Figure 1 was ground away to a diameter of 100 mm to minimise stray capacitance to the copper foil.

R1 is a trimmer control that is soldered across the meter terminals. You may wish to use a panel-mounted control for R1.

M1 in my circuit is a 200-μA edgewise

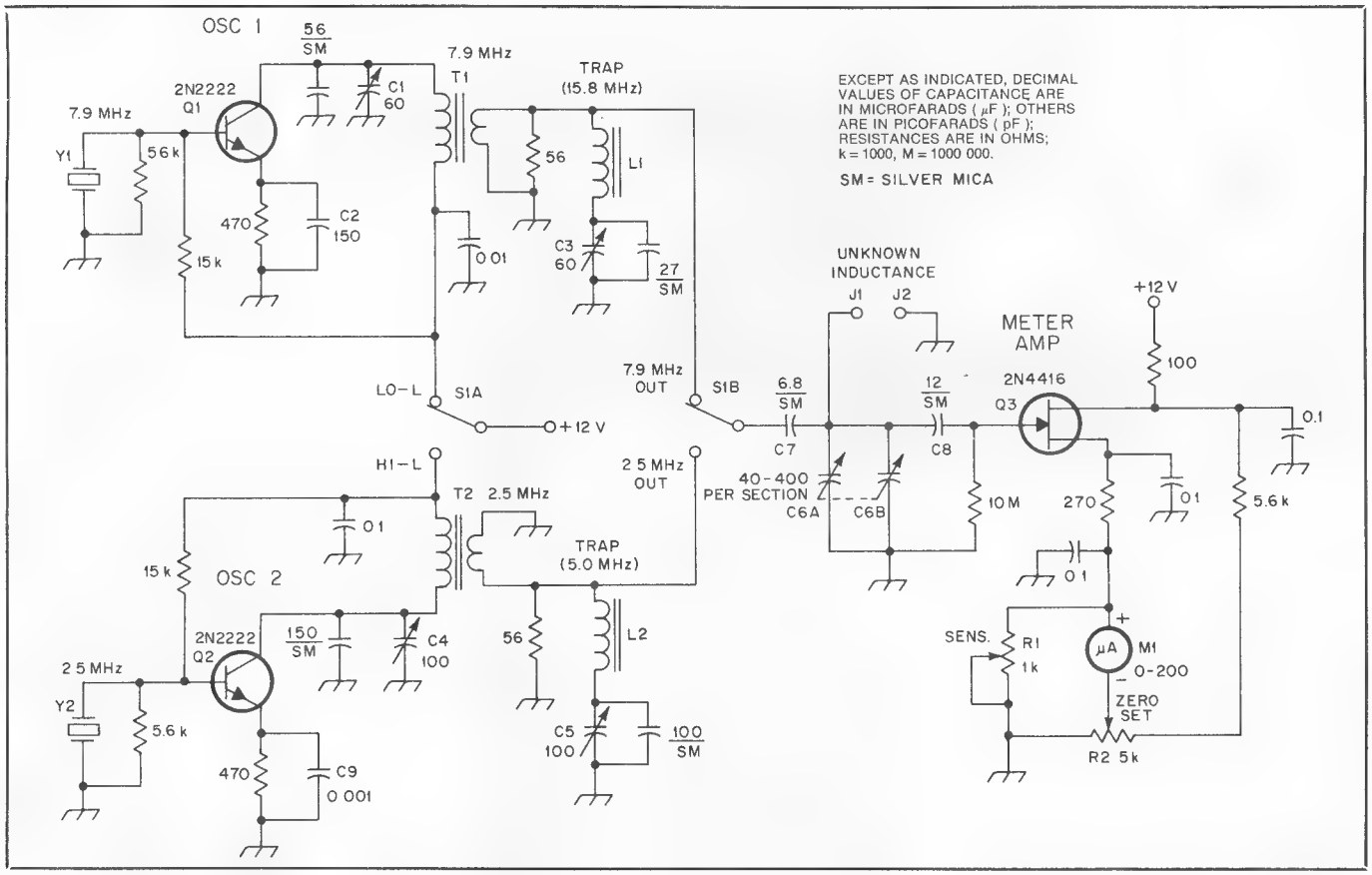


Fig 1—Schematic diagram of the two-range inductance checker. Fixed-value capacitors are disc ceramic or silver mica. Fixed-value resistors are ¼- or ½-W carbon composition.

C1, C3, C4, C5—Miniature ceramic, plastic or mica trimmer.
C2, C9—See text.
C6—40-400-pF variable (State Street Sales no. 68C96-5V or equiv).
J1, J2—Terminal post for banana plug.
L1—Toroidal inductor, 1.7 μH. 24 turns no. 26 enam wire on Amidon T37-6 toroid core.
L2—Toroidal inductor, 6.8 μH. 40 turns no. 30 enam wire on T37-2 toroid core.
M1—Miniature (or larger) 100- or 200-μA dc meter.
R1—PC-mount miniature 1-kΩ control (see text).
R2—Panel-mount 5-kΩ or 10-kΩ linear-taper, carbon composition control.
S1—DPDT toggle or wafer switch.
T1—Narrow-band transformer. 5-μH primary. 31 turns no. 26 enam wire on T50-2 toroid core. Sec has 7 turns of no. 26 wire.
T2—Narrow-band transformer. 20-μH primary. 19 turns of no 26 enam wire on Amidon FT37-61 (125 mu) toroid. Sec has 4 turns.
Y1, Y2—Fundamental crystal, 30-pF load capacitance. International Crystal Mfg Co, type GP.

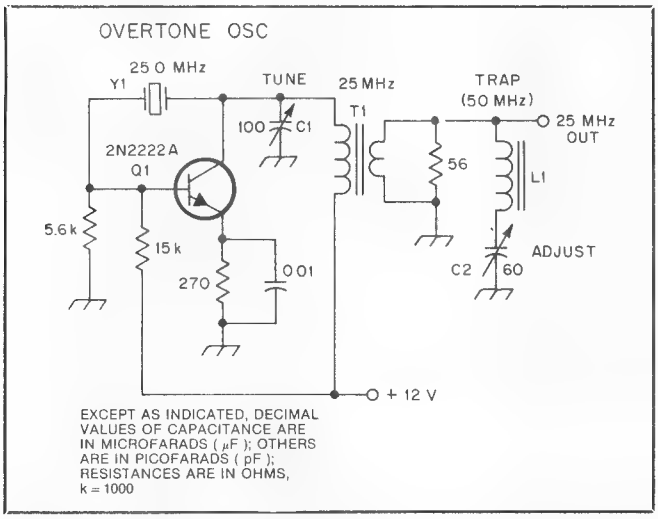


Fig 2—Schematic diagram of a 3rd-overtone oscillator for measuring inductances from 0.1 to 1.0 μH (see text). C1 and C2 are small mica, plastic or ceramic trimmers. L1 is 0.34 μH. Use 12 turns no. 26 enam wire on Amidon T37-10 toroid. T1 primary is 0.6 μH. Use 15 turns of no. 26 enam wire on T37-10 toroid core. Use 3 turns for sec. Y1 is a 3rd-overtone, 30-pF load capacitance crystal.

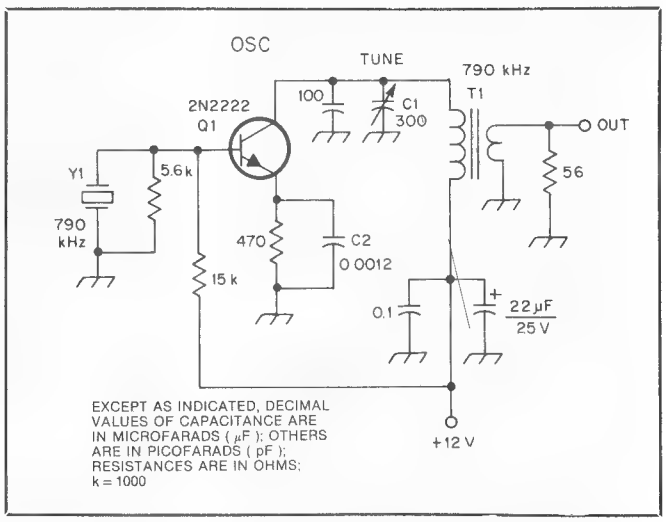


Fig 3—Circuit for a low-range oscillator (100 μH-1.0 mH). C1 is a mica trimmer. T1 primary is 135 μH. Use 45 turns of no. 26 enam wire on Amidon FT50-61 ferrite toroid. Sec has 10 turns. C2 is a feedback capacitor. The value may require adjustment to ensure reliable oscillator starting, depending upon the activity of the crystal used at Y1.

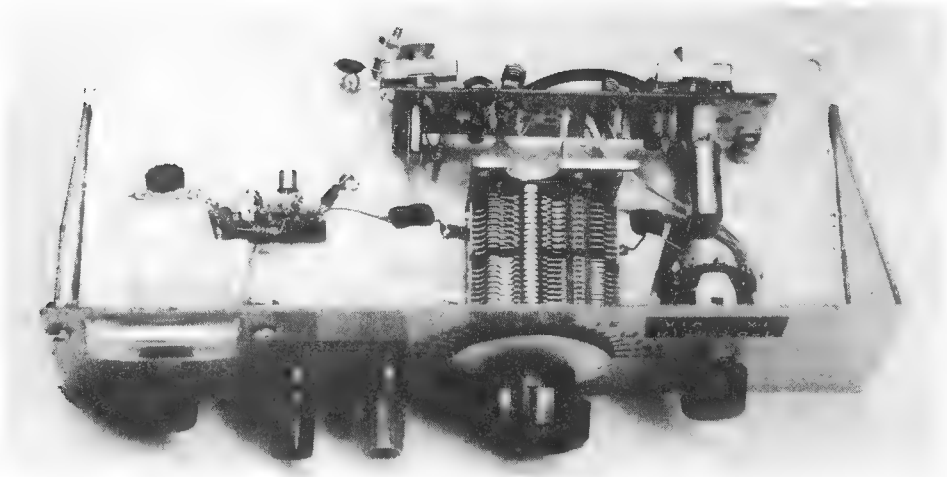


Fig 4—The "ugly construction" prototype tester built by W1FB. PC-board material is used for the chassis and panel (see text). The twin oscillators are mounted vertically near the tuning capacitor to keep the critical leads short. The meter amplifier is seen below the meter on a terminal strip.

S-meter. Any 100- or 200-μA meter may be used. You can use a 50-μA instrument, but adjustment of R1 and R2 may be more critical than when using a 200-μA movement.

I used tape labels for identifying the front-panel controls. A fine-point marking pen is ideal for marking the μH calibration on the panel (C6).

RELATIVE Q

The higher the M1 meter reading, when C6 is tuned for a peak indication, the higher the coil Q. This is a crude test at best, but it provides valuable insight into the coil quality. You can calibrate the instrument for more accurate Q readings by mounting R1 on the panel, then marking its range for various Q factors. The *ARRL Electronics Data Book (which is out of print — Ed)* explains how to measure coil Q, and a test circuit is provided. You may use one high-Q coil for the high-range calibration, then place a variable resistor (100 kΩ control) across the coil to provide various Q_u values by adjusting the control for specific lower resistances.

It is possible to build a very elaborate instrument by using the circuit in Figure 1 as a foundation. For example, a vernier drive and readout dial for C6 would represent an improvement. A shielded metal cabinet would represent a step forward, too. A larger meter at M1 would aid you in observing the meter action more easily.

CALIBRATION AND USE

Various capacitors may be used at C6, but whatever type you select should have a minimum capacitance of 40 pF or less, and the maximum capacitance needs to be 400 pF or greater. I used a surplus two-gang capacitor with both sections in parallel. The tuning range is from 35 pF to 465 pF, hence the overrun at each end of the panel dial scale.

I used a digital capacitance meter to calibrate the dial for C6. Marks were selected at 10, 20 and 30-pF increments, with the 10 pF marks near the minimum-capacitance range of C6, and the 30-pF increments towards the maximum- capacitance end of C6. The 20-pF markers are in the middle of the C6 range. Once these points are established, you may take that data, plus the known oscillator frequency, and determine the inductance value for reach capacitive increment.

C1 and C4 are adjusted for reliable oscillator starting when the HI-L, LO-L switch is cycled. I used a scope at the transformer secondary windings to set C3 and C4 for equal RF output from the oscillators. An RF probe and VTVM may be used for the same adjustment. With +12 V applied to the tester, but with J1 and J2 open, set R2 for a zero reading on M1. R1 may be set for a mid-scale reading when a test coil is attached to J1 and J2, and with C6 tuned for a peak reading on M1.

The harmonic traps are adjusted for a null on M1 when the spurious meter indication (mentioned earlier) is present. The tuning of these traps is sharp, so adjust them slowly!

You will find it handy to solder an alligator clip to a banana plug (two needed) for use at J1 and J2. This makes it easier to clip in a test coil, as opposed to unscrewing and tightening the posts on the jacks.

WRAP-UP

The crystal frequencies are critical if you wish to have the dial scale track on the various inductance ranges. However, if you do not object to plotting a scale for each range, you may use crystals of various frequencies for your instrument. My early tests, for example, were made with 2.1- and 8.0- MHz crystals, since these were the only ones I had that were close to the desired frequency. But remember, traps will need to be changed.

I am convinced that you will find this test instrument one of the most valuable in the shack. It will be helpful for determining the values of surplus slug-tuned coils and many toroidal and pot-core inductors.

Written by *Doug DeMaw W1FB*, ARRL Contributing Editor, PO Box 250, Luther, MI 49656, and reprinted from *QST* April 1986

SHRINKAGE ADVERSELY AFFECTS SOUND TRACKS

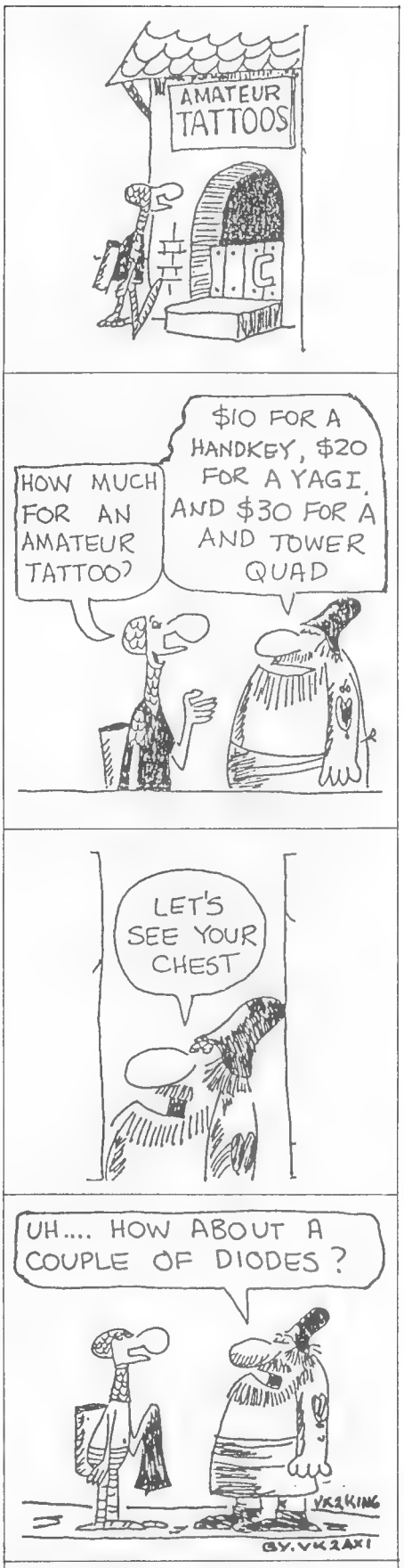
Dr Henning Schou, has devised and carried out experiments which demonstrate how film shrinkage adversely affects sound track quality, resulting in the loss of high frequency sounds.

The experiment which was carried out by Dr Schou, in Sydney, confirmed a principle which had been suspected for some time.

Dr Schou showed by means of a steady high-pitch tone of 8 kHz on film shrunk to various degrees, that the slippage which occurs in printing shrunk sound tracks onto new stocks leads to loss of these high-pitched sounds and can result in gross distortion.

He demonstrated the effect by playing a section of *Wagner's Ride of the Valkyrie* both as it should be and then as distorted by shrinkage.

From *National Film and Sound Archive Newsletter*, May 1986



Cartoon courtesy *The Propagator* July 1986

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Phone — (07) 349 7768
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Thebarton Road, West Thebarton. SA. 5031
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VK7: PO Box 1010, Launceston, Tas. 7250
VK8: Darwin Amateur Radio Club (Inc), PO 37317, Winnellie, NT. 5789

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VK4: 1.825, 3.580, 7.120, 14.342, 21.175, 28.400 MHz and Repeaters on Channel 6700 and 7000 at 0900 hours.
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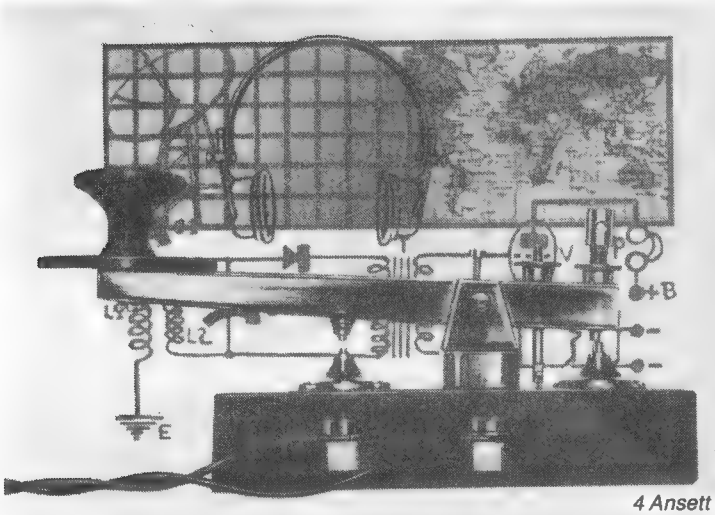
VK5: 3.550, 14.175, 28.470, 53.100 MHz. Repeaters on Ad 147.000, Mid N 146.700, SE 146.900 MHz. ATV on Ad Channel 34 UHF 579.000, Mid N 444.250, NT 3.555 and 146.500 MHz at 0900 hours
VK6: 3.560, 7.080, 14.100, 14.175, 21.185, 28.485 MHz, Channel 2 Perth, Channel 6 Bunbury, 52.080 MHz, 6 metres SSB at 0930 hours
VK7: 2 metres through linked repeaters network, Channel 2 (south), Channel 8 (north), Channel 3 (north-west), and relayed to 7.130 MHz SSB and 3.570 MHz and other frequencies as available, at 0930 hours

All broadcasts are on Sunday unless otherwise stated. All times are local.



Jim Linton VK3PC

4 Ansett Crescent, Forest Hill, Vic. 3131

75th Anniversary of Amateur Radio: The Wireless Institute of Australia

AMATEUR RADIO THEMATIC PHILATELIC

About 10 years ago, Marilyn Syme VK3DMS, began to have an interest in philately, or stamp collecting.

But it was not until five years later that she became hooked on building up a collection of philatelic items related in some way to amateur radio.

Ironically it was AR's cover in May 1980, which showed various stamps associated with amateur radio (the hobby) that sparked off her now keen interest. "That cover of AR really got me started," says Marilyn who had since tried to get most of the stamps shown on the 1980 cover. With obvious disappointment in her voice, she says "it's almost impossible to get the stamps from South America."

Maybe a reader of this article has a way of obtaining the amateur radio theme stamps from South America to add to her collection?

Collecting stamps by a theme is a specialisation in philately. Obvious themes include boats and ships, music, Christmas, space, medicine, birds, fish, horses, flight — the possibilities are endless.

Stamps can be collected and arranged so they trace the historical development of something. But according to the Usborne Guide to Stamps and Stamp Collecting, it is not always necessary to put stamps in strict historical order even when telling a story through stamps. The overall look of the page in a thematic collection, grouping stamps together to emphasise parts of your story is acceptable.

Marilyn has about four dozen stamps in the amateur radio collection, and the hunt continues for new additions. She has developed a habit of looking very closely at stamps and stamp catalogues so as to not overlook a small detail which would justify a stamp being included in the collection. However, it is not just stamps which help build up her thematic collection. Post marks, first day covers (like the WIA 75th Anniversary pre-stamped envelope in 1985), and QSL cards which have gone through the mail as post cards.

Marilyn says one of her prized possessions is a QSL card for the "First German Post War Hamfest" — the first conference of radio amateurs in Germany immediately after World War Two. It took place on June 7-8, 1947, in Stuttgart — before the Berlin Wall divided Germany.

She says another philatelic rarity is a Pitcairn Island envelope issued to commemorate the first radio transmission from that tiny Pacific Island in 1938 — the signal was transmitted by a radio amateur. Marilyn says the stamps and other philatelic item contain a lot of very interesting history and background on amateur radio activities and developments.

Part of the pleasure of having a thematic collection is writing captions for each stamp to help tell the story within the overall theme.

STAMPS AN ALLIED PURSUIT FOR RADIO AMATEURS

The average active radio amateur or shortwave listener who chases DX often finds the postage stamps on overseas envelopes that arrive carrying a much-wanted QSL are almost of as much interest as the QSL.

Unfortunately, used or cancelled stamps as philatelists call them, can be of little or no use due to them being damaged, incomplete or spoiled. But a little care when putting stamps on envelopes will increase the chances of them reaching their destination in good condition.

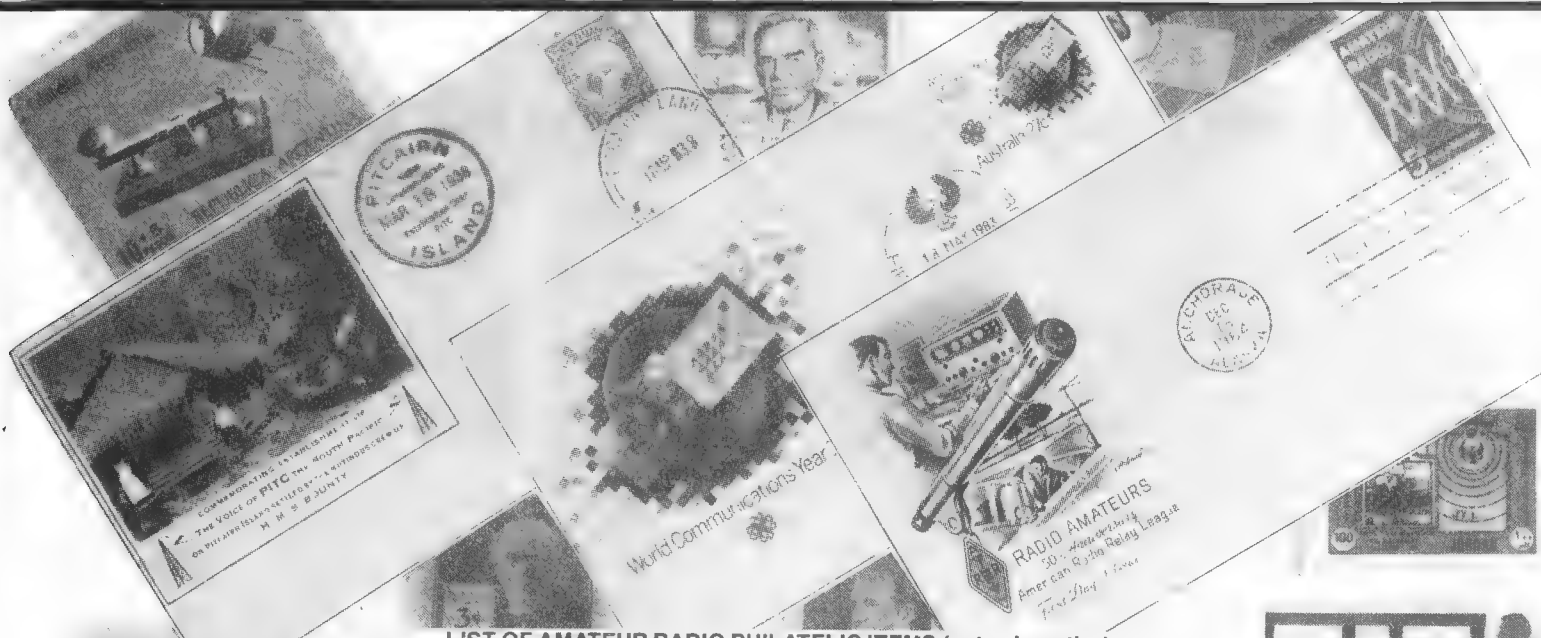
Putting a stamp in the extreme right-hand corner of an envelope is inviting it to be damaged in the postal system. Leave a few millimetres of blank envelope at the top and right-hand side of the stamp. However, experienced DXers advise against this practice when sending QSLs to some third world countries. Mail has gone missing and the theory is that in countries with a very low standard of living used foreign stamps can be converted into a meal.

The advise when sending direct QSLs to these countries is to use the plainest brown paper envelope, a damaged stamp or have it franked (cash register imprinted). While franking is officially only available when posting a large quantity of envelopes — it shouldn't be difficult to find a friendly postmaster who will assist in having the odd one or two letters franked.

And avoid identifying on the outside of the envelope that its contents are related to amateur radio — this will indicate that it contains International Reply Coupons or green-backs.

If stamp collecting does not interest you in the slightest, you will certainly find a relative, friend or neighbour who has a collection and be eager to take those foreign stamps which arrive with incoming QSLs.

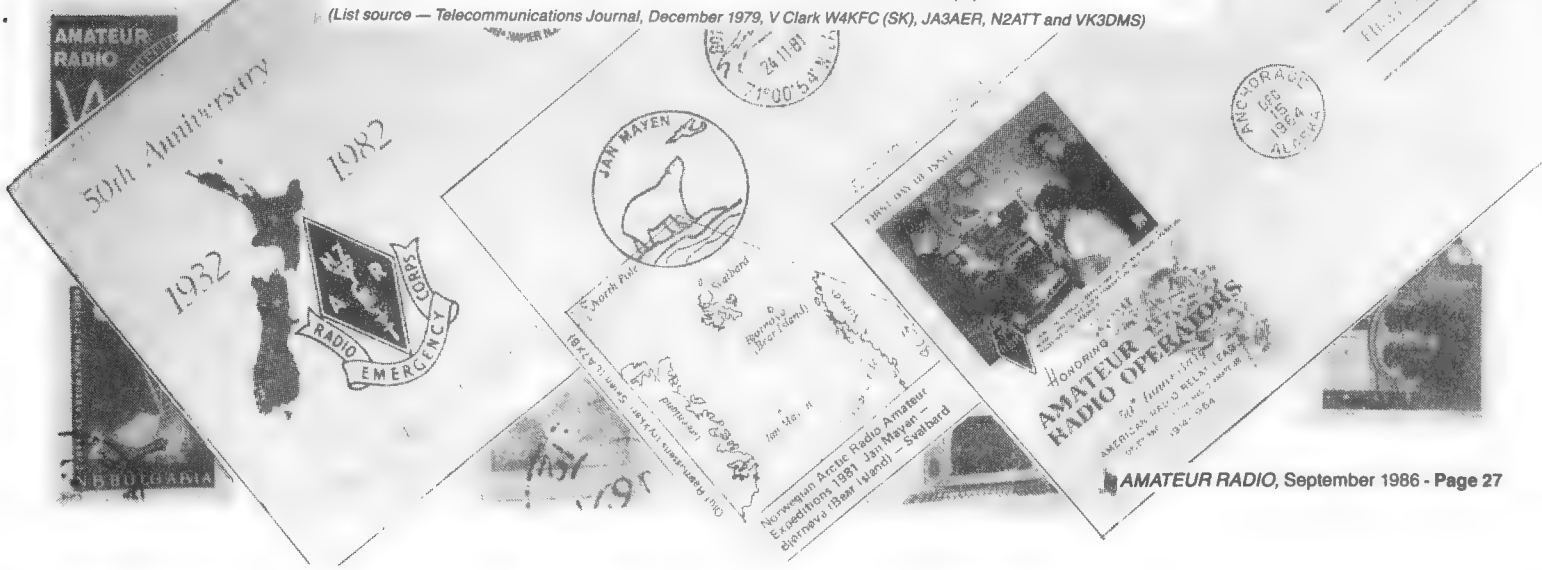
Some of us playing our patriotic part also have a variety of used Australian stamps on hand to accompany direct QSLs sent overseas.



LIST OF AMATEUR RADIO PHILATELIC ITEMS (not exhaustive)

YEAR	COUNTRY	FACE VALUE	REMARKS
1964	USA	*5 Cents*	ARRL 50th Anniversary
1966	Jordan	*1 Fil*	King Hussein
1966	Yugoslavia	*0.85d*	SRJ 20th Anniversary
1972	German Democratic Republic	*25P*	Society for Sports and Technology
1973	Colombia	*60 Centovos*	LCRA 40th Anniversary
1973	USSR	*4k*	Ernest Krenkel RA6M
1975	Poland	*1.50z*	IARU Region One Conference
1975	Costa Rica	*1.00 Colones*	16th Convention, Federation de Radio Clubes de Central America
1975	Costa Rica	*1.10 Colones*	16th Convention, Federation de Radio Clubes de Central America
1975	Costa Rica	*2.00 Colones*	16th Convention, Federation de Radio Clubes de Central America
1975	Spain	*3 Peseta*	King Juan Carlos EA0JC
1976	Dominican Republic	*6 Centovos*	RCD 50th Anniversary
1976	Dominican Republic	*10 Centovos*	RCD 50th Anniversary
1977	Japan	*50 Yen*	50th Anniversary of Amateur Radio in Japan
1977	Brazil	*1.30 Cruz*	Day of the Radio Amateur
1979	Dominican Republic	*10 Centovos*	Beata Island DXpedition
1979	USSR	*4k*	RS-1 and RS-2 Satellites
1979	Bolivia	*3 Pesos*	RCB 38th Anniversary
1979	Federal Republic of Germany	*60P*	WARC 79
1979	Switzerland	*70 Centimes*	USKA 50th Anniversary
1980	Poland	*2z*	PZK 50th Anniversary (post card and post mark)
1980	Dominican Republic	*7 Centovos*	Catalina Island DXpedition
1980	Argentina	*700 Pesos*	RCA 59th Anniversary
1981	USSR	*4k*	30th All Union Amateur Radio Exhibition
1981	Djibouti	*250 Franc*	Radio Club of Djibouti
1982	Ascension	*25 Pence*	Boy Scout Jamboree ZD8JAM
1982	Ascension	*90 Pence*	Boy Scout Jamboree ZD8JAM
1982	New Zealand	—	50th Amateur Radio Emergency Corps Anniversary (post mark)
1982	Poland	*27z*	D Maksymilian Kolbe SP3RN
1982	Chile	*7 Pesos*	ROC 60th Anniversary
1983	Sri Lanka	*2.50 Rupee*	55th Anniversary of Amateur Radio in Sri Lanka
1983	Jordan		Royal Jordanian Amateur Radio Society
1985	Australia	*33 Cent*	WIA 75th Anniversary (pre-stamped envelope)

(List source — Telecommunications Journal, December 1979, V Clark W4KFC (SK), JA3AER, N2ATT and VK3DMS)



REPEATERS — FRIEND OR FOE
A Further Look

Tim Mills VK2ZTM
PO Box 204, Willoughby, NSW. 2068

Last year, this author wrote a series on the early days of Australian Repeaters. He has received quite an amount of feedback on the earlier series, and now continues the repeater story in this issue.

It is 18 years since permission was first given to establish repeaters. The short period, 1972-75, will be remembered in Australian history, in both political, as well as the repeater sense. After 1975, came a period of general expansion, but that is another story for a later time!

I suppose repeaters, as we know them today, started their experimental life in VK2 about 1967, at Orange, where there were two carphones set up back- to-back — input on (B) 146.000 and output (A) 145.854 MHz. Due to a local intermod on the input, it was changed to 146.100 MHz (C).

Permission to establish unattended repeaters was granted in late June 1968 and the first planning meeting for channels was held at Wodonga in September 1968. From that meeting came a four-channel 500 kHz split, input high, output low system centres around 146.000 MHz. The top (4) and lowest (1) channels were only to be used at that stage with four in the capital cities. (1 — 146.1 → 145.6; 4 — 146.4 → 145.9).

VK2 applied for licenses on 1 for Orange, Gosford and Wollongong, and 4 at Sydney and Newcastle. These were not granted until 1970.

It was soon found that the close geographical spacing and only two available channels had lead to interference and inability to introduce more services. A new meeting was held at Albury in July 1972.

It was proposed to:

- Change the offset to (minus) 600 kHz, shift the outputs to above inputs, with seven channels spaced 50 kHz.
- Introduce simplex channels round 146.500 MHz and phase out the old A-B-C at 146 MHz.
- New number systems were proposed by dividing the 144-148 MHz band into 50 kHz channels from 144.000 MHz upwards.
- The old repeaters on 1 and 4 became known as either 2 and 8 or 42 and 48, and in those days of crystal control, the order did not really matter.

The channels were as follows:

Repeaters			
Ch or Ch	**Input**	**Output**	**Now**
42 or 2	146.100	146.700	**6700**
43 or 3	146.150	146.750	**6750**
44 or 4	146.200	146.800	**6800**
45 or 5	146.250	146.850	**6850**
46 or 6	146.300	146.900	**6900**
47 or 7	146.350	146.950	**6950**
48 or 8	146.400	147.000	**7000**
Simplex			
49	146.450	6450	
50	146.500	6500	
51	146.550	6550	
52	146.600	6600	
53	146.650	6650	

VK2 was not in favour of the change and at a special Sydney meeting on April 1, 1973, voted 216 to 10 to retain the old system. Even a special Federal meeting in September 1973 could not change VK2's outlook. However, as 1974 wore on, the thinking began to change, and in November another (VK2) meeting reversed the 1973 vote by a similar margin — 200 to 10 in favour of adopting the new plan. This freed the existing repeaters — Orange remained on 6700 and Dural on 7000. Gosford went to 6750, Wollongong to 6850, Newcastle to 6900, and Heathcote was granted 6800. 6950 was reserved for the Blue Mountains. The background for the rejection of the 1972 meeting by VK2 is fading as memories grow old. The reason was based on the intention internationally to introduce the satellite sub-band 145.800- 146.000 MHz. The Federal Repeater Secretariat from 1968 had been handled by VK2. By 1972, the VK3's had been trying to become the FRS and VK2 resisted. When VK3 proposed the new plan VK2 must have thought it was yet another southern plot and dug their toes in. Federal placed the FRS in VK5 for a time. It then reverted to VK3 and the passing of time saw it change from a specialist committee into one of the functions of FTAC. 1985-86 saw the production of the *Repeater Policy Paper.*

Meanwhile back in VK2 applications were submitted to change systems to the new channels. Dural was waiting for permission when a commercial base- station on 72.950 MHz was re-located from near Parramatta to Dural. This being half the Dural output frequency, the base began to hear the repeater multiplier chain. To overcome the problem and allow people time to obtain crystals, the new output frequency (147.000) was installed at Dural, and the old (145.900) was installed at Paddington and linked from Dural.

About 1975, even seven channels proved insufficient, so simplex Channel 53 — (146.650) was paired with 146.025 MHz to become Channel 1, and expansion into above 147 and 25 kHz channel spacing began. By now, rigs had changed from valve to solid-state, but were still mainly crystal locked. (America was the assumed world leader in repeaters and their plan centred on 147 — the user receivers centred on 147 and the transmitters shifting high or low at 600 kHz offset). Our plan gave Australia 31 channels on two metres. Now (1986) the larger States have almost exhausted the allocations.

Throughout the repeater development the various changes had been submitted to and debated at the Federal COnventions. The outcomes have formed the basis of Australia's Band Plans, which, together with established repeaters, are listed in the annual Call Books. These plans are often wrongly referred to as WIA Plans. They are co-ordinated by the WIA, but input effectively comes from all interested users by the various forms of representation.

The development of VK2 repeaters has continued during the past 10 years, and by mid-year, 1986, there were 40 on two metres and 16 on 70 cm. They have not been without past and present hassles, hence this series title — *Repeaters — Friend or Foe!* The development of individual systems will be outlined in future articles.

The development of repeaters on other bands followed the two metre systems. Next was the 70 cm band. Unlike two metres, where the amateur is the primary user, 70 cm is a 30 MHz segment where the amateur is a secondary service to Radio Location. In 1975, permission was granted to place unattended operation systems — beacons and repeaters — in the segment 430-440 MHz. There were some allocations already in place like the tunable operation at 432 (the third harmonic of 144) and the international ITU noted Amateur Satellite Service between 435 and 438. This really left very little choice. Region 1 had two standards, a 1.6 MHz offset of 16 channels in 433-435 MHz, or the 7.6 offset between 431-438 MHz. North America had their repeaters between 440-450 MHz with 5 MHz offset, inputs high or low, depending on the region. Canada lost this band at WARC 1979, and American amateurs up to 80 km south of the border have also recently been restricted from this segment of the band.

The Australian choice became what we have — outputs 438-440 MHz and input 433-435 MHz, minus 5 MHz offset and 25 kHz channel spacing. The reason most systems are either on 25 or 75 is that, in 1975, it was thought that these would be harmonic problems from two metre systems. It is policy still that only 25 or 75 be used. In VK2, on the coastline (at least) we have observed this approach so that the even 00 or 50 channels are clear for Tasman openings. New Zealand has six channels starting at 438.500 MHz and each 50 to 438.750 MHz.

The harmonic problem was that 438 is three times 146. However, it is a user problem, for if you transmit on Channel 6700, your harmonic will appear on 438.300 MHz. This thinking occurred while there were 50 kHz channels on two metres, but no longer is valid with 25 kHz spacing. It is a planning consideration now to avoid harmonic relationships. For example — if your area has an 8525 on 70 cm, you would not have a 6775 on two metres or the user will have feedback if listening on 8525 while transmitting on 6775. (146.175 x 3 = 438.525).

70 cm Simplex is the segment 439.000 ± .25 MHz and the low and high repeater channels 438.025-438.725 and 439.275-439.975.

Six Metres — This band has had a rough life. It was the replacement band for the old five metre (56 = 60 MHz) allocation. Granted in the 1950s, it was 50-54 MHz, and available during the best ever sunspot cycle peaking round 1958. In 1964, Australia lost 50-52 MHz for Channel 0 television (New Zealand lost 50-51 MHz for their Channel 1). Since then, use of this band has declined, no doubt in the main by the presence of Channel 0-1 television throughout most of the country. The closing down on January 6, 1986, of the SBS VHF Channel 0 Sydney and Melbourne has still left VK4, 2 and 7 with more than a dozen Channel 0 signal sources from commercial and national television.

On the FM side of six, most activity has centres on 52.525 MHz, which is in international use. Even Radio Peking once used it for a program link. In Australia there have been hundreds, maybe even thousands, of low band 'car- phones' pointed toward six metres, but only a few have made it to 52.525 MHz. In VK6 they had a channel on 52.656

MHz, and VK2 made a little use of 52.700 and 53.950 MHz. There was perhaps more AM activity with converted Pye Reporters on channels like 53.032, 53.035, 53.100, 53.866 and 53.982 MHz. Most systems developed due to the availability of surplus crystals.

Demand for six metre repeaters in Australia has been limited. There is one licensed in VK6, two in VK3, one in VK2 with current interest for a second in VK2 and one in VK4. The Australian Band Plan was developed when the international offset was 600 kHz. Since then, America has adopted a 1 MHz offset and equipment manufacturers have altered to suit. At the 1986 Federal Convention it was agreed to change our offset to 1 MHz. These changes are currently being incorporated in the Band Plan.

The plan set the channel spacing at 25 kHz with two channels for each of Australia's eight States or Territories on a single use per channel basis. The thinking was to allow clear channel working during times of band openings. There is nothing to prevent a State Repeater Committee re-using the same channel as often as they like within their State, particularly if they pick the null points in the usual local skip distances. Interstate openings may key more than one, but is a small price to pay if it helps to get activity on the band!

Overseas (mainly America) 10 metre repeaters have developed, often with extra inputs/outputs on VHF/UHF channels. The segment is 29.500 to 29.700 MHz, four channels, 20 kHz spacing with 100 kHz offset. Simplex at 29.600 MHz. To date, there has been limited VK3 and VK6 interest. If established they would only be available to full call licensees. From an engineering viewpoint they ideally need split receiving — transmitting sites to overcome the de-sense present with the close input/output spacing. VK6 have progressed to the point where they have prepared and submitted an application for a 10 metre repeater.

Moving toward the other end of the spectrum, the 23 cm band is now starting to attract international repeaters. The equipment being manufactured usually covers 1260-1300 MHz. 25 kHz channel spacing with fully programmable offsets. The world has a variety of offsets, the Japanese have 20 MHz, and some Europeans have 33 MHz. Australian amateurs are the secondary service in this band to Radio Location and has to observe the (ITU) Amateur Satellite Service 1260-1270 MHz. Also, Australia has 6-150 mile (10-240 km) radius aviation radars in the segment 1270-1280, together with the tunable portion at 1296 (144 x 9) and further radars starting at 1300 MHz. Much debate has occurred for the Australian repeater segment and there appears little option other than the chosen segment in 1240-1260 MHz with a 12 MHz offset.

It is unlikely that there will be any repeaters in the higher microwave frequencies in the near future although there are a few specialised systems in America.

Another repeater interest for Australia is those developed for amateur television. Reception of signals has been made easy by having a segment available to the amateur service within the tuning range of a television set with a UHF tuner. Developing a good signal for a television transmission is difficult when one considers the bandwidth involved and the amateur power levels available. Add to this the difficulty of developing power for the higher the frequency in use.

There are two amateur television channels at 70 cm — ATV1 (video 426.250) and ATV2 (444.250), one at 50 cm, Channel 34/35 and two at 23 cm. The popular combination for a repeater is to transmit to it on ATV1 and view the output on 50 cm.

The final form of repeaters must be those carried aloft in the various amateur satellites which provide both in-band and cross-band operation.

Since 1975, repeater development has been straight-forward following the guidelines and established band plans. It has not been without drama — various repeaters have been attacked and/or stolen, others fall victim to anti-social behaviour. Many have reflected amateur ingenuity in sites, power sources or what functions they perform. Their story will be told in future issues of *Amateur Radio*. ar

FIRE DEVASTATION

A few hours after August *Amateur Radio* left the premises at midday, July 16, a severe fire commenced at Leader Westernport Printing Pty Ltd, the printers of *Amateur Radio*. They recently acquired the business from the Waverley Offset Printing Group

The fire became uncontrollable within minutes and even with the services of 14 fire and two snorkel units, manned by 60 firemen, the plant that employs in excess of 50 staff, was unfortunately gutted beyond repair with damage which is presently estimated to be in excess of three million dollars. Fortunately, none of the personnel were injured

Processing equipment from sophisticated cameras to printing presses were reduced to rubble within the hour, including many tonnes of paper, hundreds of litres of chemicals, inks and considerable artwork belonging to numerous customers (some irreplaceable) being destroyed.

The famous saying of the theatre industry "The show must go on . . ." can also be attributed to the printing fraternity, as, within hours of the catastrophe, alternative arrangements were made for the printing of this and future issues of *Amateur Radio,* so that they would be in the mail boxes within a day or two of the scheduled date, to alleviate as much inconvenience as possible to members in the ensuing future

Thank you, management and staff of Leader Westernport for your consideration.

Submitted by Ken McLachlan VK3AH

Firemen were helpless as the rear wall of the plant collapsed. They then directed their attention to extinguishing the rolls of paper in the factory.

Photograph courtesy *Herald and Weekly Times Ptd Ltd*

ILLAWARRA AMATEUR RADIO SOCIETY

The Illawarra Amateur Radio Society will celebrate 25 years of operation in the Illawarra area during March 1987.

At a committee meeting held on June 17, 1986 it was decided to try to arrange a special occasion for this important anniversary.

To make it a gala occasion, the society would like to hear from members, past members, past members families or anyone who has knowledge of (no matter how small) the amateur radio clubs existence in the Wollongong area during the period 1962-70.

Any information, memories, documents and even photographs which would be used to compile an up-to-date documentary for the occasion would be sincerely appreciated.

All items submitted will be handled with utmost care and will be returned to their owners in their original condition

Acknowledgment will be given to the persons concerned if they so desire

Any readers who may be able to help with this matter are requested to contact Dave VK2PZY on 84 9872 or Morry VK2EMV, 83 1219, or write to them care of the club at PO Box 1838, Wollongong, NSW. 2500. ar

REPORT OF THE FTAC REPEATER AND PACKET PAPERS

Peter Gamble VK3YRP
Chairman, FTAC

As indicated in earlier issues of *Amateur Radio*, the *Federal Technical Advisory Committee* (FTAC) had prepared discussion papers titled "Review of Amateur Radio Service Terrestrial Repeaters" and "Review of Amateur Radio Service Packet Communications." Summaries of these papers were printed in the February and March 1986 issues of *Amateur Radio*.

A paper titled "Band Plans for the Amateur Service" was also prepared and was presented in a three part article in the January, February and April 1986 issues of *Amateur Radio*.

Following comments from a number of amateurs, amendments were made to the papers, which were then printed and circulated for discussion at the 1986 Federal Convention. A brief presentation was made on the highlights of each of the papers by the Chairman of FTAC. Following extensive discussions, both in the formal Convention sessions and during "meal" and other breaks, the papers were adopted with some modifications.

The following article presents the recommendations from the "Repeaters" and "Packet" papers. The results of the discussion on the "Band Plans" paper will appear next month.

One of the topics in the Repeater paper which caused the most interest was the subject of the cross linking of repeaters. Accordingly, that section of the paper is presented in full.

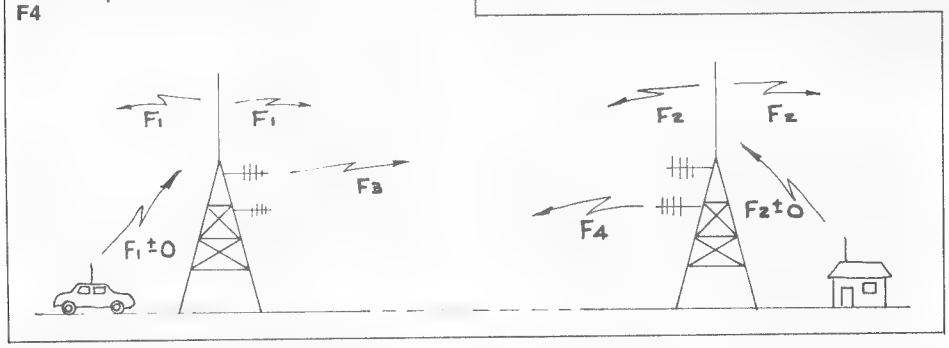
4. CROSS LINKING OF AMATEUR REPEATERS

4.1 Introduction

As indicated in the opening section of this paper, repeaters are an enhancement of the amateur service. There are many ways that this enhancement can be achieved, such as by using new technologies and new modes, and by expanding considerably the service area of an existing repeater. A typical example of the last point is the expansion of the amateur satellite service where VHF/UHF contacts to countries halfway round the world are now possible.

Figure 1 illustrates the general components of repeater linking. Note that a key part of the linking process is the establishment of separate transmit and receive equipment to pass the linked signals from one repeater to another. Where repeaters share an overlapping service area and the same transmitting and receiving frequencies, but do not exchange the repeated signals on a separate frequency, they are not considered to be linked. An example of this type of operation are some of the packet repeaters now being established.

Figure 1 — General Configuration of Linked Repeaters.
Repeater 1: Transmit Frequency F1, Receive Frequency F1 ± 0
Repeater 2: Transmit Frequency F2, Receive Frequency F2 ± 0
Link Frequencies: R1 to R2 ➡ F3, R2 to R1 ➡ F4



4.2 The Present Situation

One technique for expanding the service area of a repeater is to link it to another repeater. This could be done for a variety of reasons, for example to carry a news broadcast to more listeners, or to provide coverage from an isolated country area back to a neighbouring town or city, or to link a major population centre with its nearby recreational area.

Approval has been given by the Department of Communications for three particular instances of cross linking on a trial basis. These are:

- Tasmania — a link to relay WIA Broadcasts,
- South Australia — to link city and country Amateur Television activities,

and

- Western Australia — to link city and country voice repeaters where the country repeater serves an isolated stretch of highway north of Perth.

It is anticipated that further requests for repeater linking will be forwarded to the Department. These are expected to be primarily for extending the service area of a repeater, whether it be voice or specialist modes such as Amateur Television or Packet Radio.

4.3 General Guidelines for Repeater Cross Linking

The Wireless Institute believes that cross linking of repeaters should be supported provided that certain conditions are met. The reason for the cross linking should be consistent with the aim of enhancing the amateur service.

The following points are offered as guidelines for the licensing of linked repeaters irrespective of mode:

a. Each repeater in the linked group is to be licensed individually according to the normal repeater licensing requirements. The cross linking is to be the subject of a separate application. Further, approval in principle may be sought for any or all of the applications.
b. Cross linking of repeaters will not be permitted where such an arrangement allows an amateur to originate a signal on a band or in a mode that he or she is not normally permitted to use.
c. Cross linking may be either permanent; ie all transmissions are cross linked, or temporary for specific purposes; eg only WIA news broadcasts or WICEN activities are cross linked. Where cross linking is for a temporary specific purpose, then it may be appropriate to modify some of the following conditions as indicated.
d. The traffic and interconnecting signals for permanent cross linking of repeaters should not normally be carried in the same amateur band. While it is preferred that this band be a higher frequency band, it is noted that propagation characteristics of a particular location may require the linking to be done on a lower VHF/UHF band. Further, the cross linking frequencies should be in accordance with an approved Wireless Institute Band Plan.

Cross linking of repeaters for a temporary specific purpose; eg a Wireless Institute Broadcast or for WICEN activities, will be permitted to use "off- air" signals for input.

e. Where the cross linked repeaters are in different states, then approval of all the relevant WIA Divisions is required.
f. The maximum number of repeaters to be cross linked where simultaneous emission is used will usually be a maximum of three. Where the received transmission is stored before re-transmission; eg in RTTY or Packet mode operations, or where repeaters may be selectively added to the link, then this limit does not apply. This restriction does not apply to the cross linking of repeaters for a temporary specific purpose; eg a Wireless Institute Broadcast or for WICEN activities.
g. All ATV repeaters and links should not use double-sideband emissions only for picture signals.

It is noted that further mode specific conditions may need to be applied from time to time to overcome difficulties that are being encountered or are foreseen.

RECOMMENDATIONS

The Wireless Institute believes that the present approach by the Department of Communications to amateur service repeaters and translators is generally satisfactory. This is shown by the ever increasing number of these devices that are being placed into service by the amateur fraternity.

However, there are a number of points arising out of the new regulations which require further discussion and consideration. Accordingly, the Wireless Institute makes the following recommendations:

1. That the justification or need for a repeater is a matter for the amateur service to determine.
2. That the Wireless Institute develop and publish guidelines for the use of various modes of repeaters as required.
3. That the Wireless Institute develop a procedure to co-ordinate repeater licence applications.
4. That the Wireless Institute develop a set of maximum time-out periods for various modes and locations of repeaters, policies for the use of specialised access control techniques, and other technical standards as necessary.
5. That the Wireless Institute discuss further with the Department of Communications the ef-

fects of ensuring amateur repeaters met specified constructional and operational standards with a view to minimising the effect on amateur repeaters when interference is being caused by other spectrum users.
6. That repeaters continue to be permitted in the six metre band and that the matter of repeaters in the 10 metre band be discussed with the Department of Communications with a view to such devices being permitted in accordance with international band planning principles. Further, that 10 metre repeaters be permitted to use 5 kHz deviation transmissions.
7. That the guidelines proposed in Section 4 of this paper for the cross linking of repeaters in the amateur service be approved.

If the above recommendations are accepted by the Department of Communications, then the enhancements they permit to the amateur service repeaters will allow amateurs to continue to experiment with new technology, and to provide valuable community service in times of need.

In addition to the presentation of the Packet Radio Paper, which include some explanations on Packet techniques, the Melbourne Radio Packet Group put on a demonstration. This enabled the delegates and visitors to see first hand the operation of a Packet Radio Station.

The following is the final section of the paper which contains the recommendations:

7. RECOMMENDATIONS

After consideration of the various issues raised by the development of Packet Radio Communications, the Federal Technical Advisory Committee presents the following recommendations for adoption by the Wireless Institute of Australia.

1. All Packet Radio Protocols which ensure that call signs or call sign information is contained in each packet should be permitted, and that no requirements be placed on equipment design except those generally necessary under the existing amateur radio service regulations.
2. Any amateur radio operator may set up a packet radio station if permitted to do so under the terms of their existing licence. Further, such an amateur station may operate in the unattended mode for the purpose of receiving information from another packet mode station providing that suitable fail- safe firm-ware is incorporated to ensure that the transmitter cannot remain keyed on for an excessive period of time. While this station is operated in the attended mode, it may be used to receive and retransmit incoming packets destined for other amateurs, and also provide computer or network resources.
3. Any group of amateurs may apply for a licence to establish and operate a continuously operating range extending or repeater device for packet radio. Such an application should be in the form of a conventional repeater application. No restriction should be placed on access to this facility by appropriately licenced amateur operators.
4. Any amateur or group of amateurs may apply for a licence to establish and operate a continuously operating station which provides computer resources for other amateurs. Such an application should be in the form of a conventional repeater licence. It should not be mandatory for restrictions to be placed on access to this facility by appropriately licenced amateur operators, this being up to the discretion of the licenced operator. All calls to this facility are to be logged by the system, the information to be recorded to include call sign information and time and date. Further, if such a system is connected to a telecommunications network, then material originated from such a network cannot be made available for transmission over the amateur radio link. Further, a system licenced under this section is permitted to automatically originate a call over the amateur radio service and deliver a previously lodged message.
5. That the above recommendations 1. to 4. be represented to the Department of Communications as guidelines for the operation of amateur service packet radio stations.
6. That protocols which comply with these guidelines and make efficient use of the radio spectrum be promoted.
7. That Terminal Node Controller designs which allow the use of more than one protocol be promoted.
8. That range extending repeater devices and computer systems that comply with recommendations c. and d. above be promoted.

If the above recommendations are accepted, both by the WIA and the DOC, then amateur radio operators will be able to continue exploring new frontiers of technology in the traditions established over the last 75 years.

Following the adoption of the above recommendations on Repeaters and Packet Radio at the 1986 Federal Convention, the Federal Executive was requested to make the necessary representations to the Department of Communications. That process has already started and further reports will be presented on the results of the discussions with DOC.

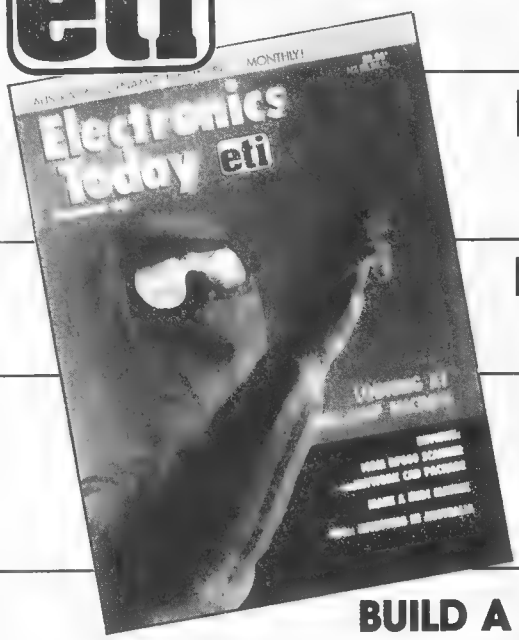
I would like to thank all of the amateurs who contributed to these papers, both during their initial drafting and as a response to the printing of the earlier versions in *Amateur Radio*. As a result of the wide ranging discussions that had been held right around Australia on these topics, the Federal Councillors were well briefed on the issues when they arrived in Melbourne for the Convention.

References:

1. *Review of Amateur Radio Service Terrestrial Repeaters*, Issue 4.0, dated July 10, 1986.
2. *Review of Amateur Radio Service Packet Communications*, Issue 3.0, dated July 10, 1986.

eti

SEPTEMBER GOSPEL BROADCASTERS ON SHORTWAVE



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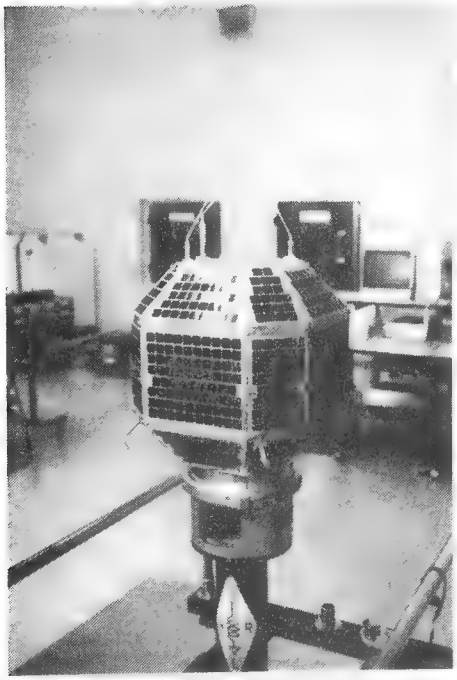
JAS-1 IS GO

The Japanese Amateur Satellite Project, JAS-1, has been promoted since 1983. JAS-1 was due to be launched on August 1, 1986. Following is a general run-down of the leadup to the launch.



Project JAS-1 began in 1983. Flight Model FM-1 was completed in March 1985 and FM-2 in November 1985.

FM-2 began its journey to Tanegashima on June 21, 1986, using a vehicle with air-suspended wheels. It was accompanied by much measuring and test equipment. It arrived on June 24, 1986. Flight Model 1 followed FM-2. The reason why both satellites were taken to the centre was to be prepared for any type of emergency.

Tanegashima, the launching site, is located in the southern part of Japan. Tanegashima (shima means island) is historically famous to Japanese people as the place the matchlock was brought to Japan for the first time by Portuguese more than 400 years ago.

The National Space Development Agency of Japan (NASDA) newly developed launch vehicle H-I consists of two stages of rocket, with the propellant of the second stage being liquid oxygen and hydrogen. This vehicle is capable to "throw" a payload of 1800 kilograms into an orbit of 1500 kilometres altitude with an inclination of 50 degrees.

This will be the first flight of H-I. Instead of a dummy payload, three missions will be on board H-I. They are: EGP, the experimental geodetic payload, JAS-1 and the magnetic bearing flywheel experiment.

About one hour after launch, the second stage rocket will be over the South American Continent and the two payloads will separate from the rocket sequentially.

JAS-1 will be activated at the moment of separation when the power supply turns on, and the first signals should be heard by the Centro de Estudios Espatiales (CEE) of the University of Chile.

About 20 minutes later, JAS-1, flying northward, will be over England where the staff of the University of Surrey will be waiting to check the health of the new-born satellite.

When JAS-1 is successfully separated from the launch vehicle, it will transmit a beacon signal on 435.795 MHz from a Japanese transponder, with some Doppler shift of frequency.

The beacon contains the telemetry data in a format shown in Table 1. This data is sent in Morse code, beginning "Hi Hi" with a speed of about 100 characters every minute. It repeats in this format.

Table 1.

Hi Hi	1A	1B	1C	1D
	2A	2B	2C	2D
	3A	3B	3C	3D
	4A	4B	4C	4D
	5A	5B	5C	5D

There are 30 items of data and 33 items of status in the telemetry of JAS- 1, however, the beacon carries 12 data items and all status.

The telemetry reads as follows:

In analog data 1A through 3D, A, B, C and D express two digits of decimal value. This is a row data and the value should be divided by 50. Let this quotient be N, for each item. True value of each item is obtained by the conversion shown in Table 2.

Table 2 –Conversion of Analog Telemetry

Item		
1A	Current of Solar Cells, 0-2 A	I = N Amp.
1B	Charge/Discharge Current of Battery, -2 to +2 A	I = -(1 -N) x 2 Amp.
1C	Terminal Voltage of Battery, 0-20 V	V = N x 11 Volt.
1D	Centre-tap Voltage of Battery, 0-10 V	V = N x 4.92 Volt.
2A	Bus Voltage, 0-20 V	V = N x 10.08 Volt.
2B	Regulated Voltage +5 V, 0-7.5 V	V = N x 3.004 Volt.
2C	Output Power of JTA, 0-3 W	$P = N^{1.618} \times 1.101$ Watt.
2D	Calibration Voltage, 0-2 V	V = N Volt.
3A	Temperature of Battery Cell, -50 to +70 degrees Celsius.	
3B	Temperature of Bus Structure 1	
3C	Temperature of Bus Structure 2	Temperature is reduced as
3D	Temperature of Bus Structure 3	T = (1.3 - N) x 73 degrees Celsius.

This table of telemetry does not show any nominal value, but these values will tend to converge to some definite values or range through the operation of the satellite for several months.

Table 3.

Decimal	Binary	Decimal	Binary
0	000	4	100
1	001	5	101
2	010	6	110
3	011	7	111

Status is expressed from 4A through 5D. Each character represents two digits of decimal numbers, 0 to 3 for the left digit and 4 to 7 for the right digit. These two digits can be written in binary code as shown in Table 3. You can find five independent binary pairs out of this Table. For example, if the first item of status 4A were 423, 4 should be removed, and the binary code (010) for 2 and (011) for 3 are put in order, 010011. The left bit of two binary sets, 0 is common or redundant, so the first 0 is removed — thus it becomes 10011. This expresses the inverted order of status, No 5 to No 1; ie 1:No5 beacon PSK, 0:(blank), 0:(blank), 1:JTD ON, 1:JTA ON. Expression of status goes like this to status No 33, every five status, and this is shown in Table 4. This expression is possible because all of the status have only two situations, ON/OFF or 1/2 and so on.

The launch window will be limited within two hours, 2000 to 2200 UTC of the pertinent day. JAS-1 will begin to transmit its beacon signal with the telemetry described in this article, after its separation from the launch vehicle above the South American Continent.

Initially, JAS-1 will be operated only in analog mode. For digital operation, preparation working is required and it will become available one to two months after launch.

Table 4 — System Status.

1	JTA On/Off	12	PCU Level- II	23	IPL Sel 0
2	JTD On/Off	13	PCU Manu/ Auto	24	IPL Sel 1
3	(Blank)	14	CMD Priority	25	CRC Mod
4	(Blank)	15	CMD Sel	26	Sunlit/Shade Sensing 1
5	Beacon PSK/ CW	16	MEM 0 On/ Off	27	Sunlit/Shade Sensing 2
6	UVC On/Off	17	MEM 1 On/ Off	28	Sunlit/Shade Sensing 3
7	UVC Level 1/2	18	MEM 2 On/ Off	29	Sunlit/Shade Sensing 4
8	BAT Full/Tric	19	MEM 3 On/ Off	30	Sunlit/Shade Sensing 5
9	BAT Logic F/T	20	CPU On/Off	31	CW CPU/TLM
10	Main Relay On/ Off	21	MSEL 0	32	CPU Reset
11	PCU Level-1	22	MSEL 1	33	CW TLM

SPECIFICATIONS

Scheduled launch, August 1, by H-I vehicle from the Tanegashima Space Centre of NASDA, Japan.

The orbit will be circular at an altitude of 1500 km. Period — 116 min, inclination 50 degrees. Projected three years life.

JAS-1 is a Polyhedron of 26 faces covered in solar cells, weighs 50 kg and is 400 mm (diameter) x 470 mm (height). Power generation — eight watts at the beginning of life.

Communication Sub-system: Analog (JA) and digital (JD) communication in mode J.

Transponders:

Analog transponder (Linear transponder)

Input frequency — 145.900-146.000 MHz (bandwidth 100 kHz)

Output frequency — 435.900-435.800 MHz (inverted sideband)

Required uplink EIRP — 100 watts

EIRP of transponder — two watts PEP

Digital transponder

Input frequency — four channels of 145.850, 145.870, 145.890, 145.910 MHz

Output frequency — 435.910 MHz (one channel)

Required uplink EIRP — 100 watts

EIRP of transponder — one watt RMS

Signal format — 1200 Baud PSK, store and forward

Beacon and Telemetry

JA Beacon — 435.795 MHz, 100 mW CW or PSK

JD Telemetry — 435.910 MHz, one watt PSK

Orbit Parameters:

Epoch — 1986-07-31, 21h, 32m, 07.20s UTC

Semi-major axis — 7879.562 km

Eccentricity — 0.000140656

Inclination — 50.0039 degrees

RA of ascending mode — 237.456 degrees

Argument of perigee — 2.155 degrees

Mean anomaly — 330.246 degrees

Compiled from material supplied by Shozo Hara, President, JARL

EXTRACTING TOOL FOR LCCs

The EX-4 is a hand-tool for safely and reliably extracting leadless chip carriers (LCCs) from board mounted sockets. It helps prevent unnecessary overstress to chip carrier pins by maintaining even pressure on contacts during removal.

When the operator is properly grounded, the easy to use tool safely dissipates static charge to prevent damage to components.

Models are available for 20; 28; 44; 52; 68; 84 and 124 contact chip carriers.

Abridged from *Electronic News*, p34 — April 1986

Australian Amateur Station Call Signs

Jim Linton VK3PC
4 Ansett Crescent, Forest Hill, Vic. 3131

This is a guide to call signs, and special prefixes and suffixes issued by the Department of Communications to stations in the Amateur Radio Service.

The unrestricted licence call sign prefix is VK followed by a single number indicating the state or territory in which the station is licensed.
0 — Australian Antarctic Territory; 1 — Australian Capital Territory; 2 — New South Wales; 3 — Victoria; 4 — Queensland; 5 — South Australia; 6 — Western Australia; 7 — Tasmania; 8 — Northern Territory; 9 — External Territories (VK9L — Lord Howe Island; VK9M — Mellish Reef; VK9N — Norfolk Island; VK9X — Christmas Island; VK9Y — Cocos (Keeling) Islands; VK9Z — Willis Island).

SUFFIX

The suffix indicates the licence grade.
Amateur Unrestricted — AA-ZZ; AAA-FZZ.
Amateur Limited — TAA-TSZ; TUA-TZZ; XAA-XZZ; YAA-YZZ; ZAA-ZZZ.
Amateur Novice — MAA-NZZ; PAA-PZZ; VAA-VZZ.
Amateur Combined (Novice and Limited — JAA-KZZ
(Exceptions were VK5JSA and VI5JSA for Jubilee South Australia which has amateur unrestricted privileges).
Amateur Repeaters and Beacons — RAA-RZZ

There are exceptions to the three-letter R-suffix. VK3RAN is issued to an amateur radio station set up on the HMAS *Castlemaine* a preserved World War Two Corvette located at Gem Pier, Williamstown, and VK1RAN is the Royal Naval Amateur Radio Society, whilst VK4RAN is operational on board the HMAS *Diamantina* under the auspices of the Queensland Maritime Museum.

Some departures from the normal call sign suffixes include GGA Girl Guides Association, and SAA-SZZ Scout Association.

Other miscellaneous club-type stations are VK3SES, Victorian State Emergency Service, VK3SJA, and VK3SJB St John Ambulance Brigade, and teletype groups in various states have the suffix TTY.

A station with a suffix from the block WIA-WIZ is associated with WIA activities. These call signs are used by either WIA club stations or WICEN. VK3WIA is the club station of the WIA Federal Body.

The suffixes WI, AWI and BWI are traditionally reserved for the WIA. In VK3 and VK4 the WIA also has the ZWI suffix.

The holder of call signs with the suffix AA is listed as "Official Call Sign" which means the Department of Communications.

DISTINCTIVE SUFFIXES

From time to time, special call sign suffixes are issued. VK2OTC is the Overseas Telecommunications Commission Amateur Radio Group, the suffix ITU is for use by the WIA which is a member of the International Telecommunications Union through the International Amateur Radio Union, the Commonwealth Games station in Brisbane AX4QCG had an activation period of September 30-October 9, 1982, VK3UAM was a demonstration station call sign for University of the Third Age, Monash. The World Communication Year (1983) saw the suffix WCY used, IYP was a suffix during the International Year of Peace (1986), and VK1WVH is the Woden Valley Hospital Radio Club.

ALTERNATIVE PREFIXES

The alternative optional prefix AX was first used in commemoration of the Cook Bicentenary (1970).

The next occasion was for the Royal Australian Corps of Signals Jubilee when commemorative station AX3SIG was on air from the Signals Depot, Watsonia Barracks, Macleod, Victoria, November 3-10, 1975.

Four years later, AX was used to mark the 150 Anniversary of Western Australia in 1979.

The AX prefix celebrated the Royal Wedding on July 29, 1981, the Commonwealth Games in Brisbane saw AX available from August 15-October 15, 1982, and AX helped celebrate the America's Cup win by Australia on September 27, 1983.

A special call sign, AX0PB, was issued for Project Blizzard (1983-84 and 1985-86) in recognition of the project's national significance when it undertook restoration work on Mawson's Hut and scientific investigations in the Antarctic.

Another alternative prefix VI was first used for the 150th Anniversary of European settlement in Victoria (1984-85), then for the WIA's 75th Anniversary (1985), followed by commemorative call sign VI5JSA marking Jubilee 150 — South Australia's Sesquicentenary (1986).

The next likely occasion a special prefix will be available is for Australia's Bicentenary in 1988.

A unique call sign, VK75A, was issued by DOC in 1985 for use by the WIA during its 75th Anniversary in recognition of this milestone in amateur radio. It was the first and only amateur radio call sign in Australia with a double-digit prefix and also had the distinction of having a single letter suffix.

During the WIA 75 celebrations VK75A was activated by WIA members throughout Australia on a roster basis.

Overseas visitors in Melbourne for the WIA 75 Dinner, November 1985, were issued calls from the virgin block of VK3FAA-FZZ.

WHY HAVE SPECIAL PREFIXES OR SUFFIXES?

Various events and anniversaries throughout the world are celebrated each year — sometimes they have only local interest, but can also be of national or international significance.

Postal authorities bring out stamps, pre-stamped envelopes, first-day covers, and post-marks to help celebrate a special occasion.

Commemorative car number-plates, T-shirts, coins, medallions, badges, and regalia also provide a means of having something personal and tangible to celebrate an occasion

The hobby of amateur radio helps spread international friendship and understanding, and it is a national thing for radio amateurs to commemorate a significant event through their hobby. After all, our hobby is part of the general community and by using special prefixes or suffixes at the appropriate time it can play its part in a celebration.

An Australian event can be publicised overseas on air and via follow-up commemorative QSL cards or awards. This has also given participating radio amateurs the opportunity of radio, television and newspaper publicity about amateur radio's community role in helping celebrate an event.

NOT ALL VK STATIONS ARE AMATEUR

The letters VK are used in call signs for other than amateur radio stations. Experimental Stations can be given VK calls, with the same numerical indicator system, but a single letter suffix.

Small boats also have VK call signs but the prefix is followed by a series of numbers.

State police have a three letter call sign — VKC Melbourne, VKA Adelaide, VKG Sydney, VKI Perth, and VKR Brisbane. The Melbourne Metropolitan Fire Brigade signs VKN8 and there are other examples of VK call signs.

For additional information on Australian Amateur Station Call Signs and their history see an article "Notes on Call Signs and QSLs" in the *WIA Book Volume 1*, pages 52-55.

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Novice Notes

Drew Diamond VK3XU
Lot 2, Gatters Road, Wonga Park, Vic. 3115

DIRECT CONVERSION RECEIVERS — Here to stay

The direct conversion (DC) receiver has been enjoying renewed popularity for some time now. This is due probably to the surprisingly good performance obtainable from relatively simple circuitry. To my knowledge, at least one manufacturer of amateur equipment; *Ten Tec*, USA, has produced a transceiver with a DC receiver section. As far as can be determined, the signal performance can equal, and in some instances exceed that of the more complex *superhet*. There is only one real disadvantage with DC; the *audio image* is very difficult to eliminate.

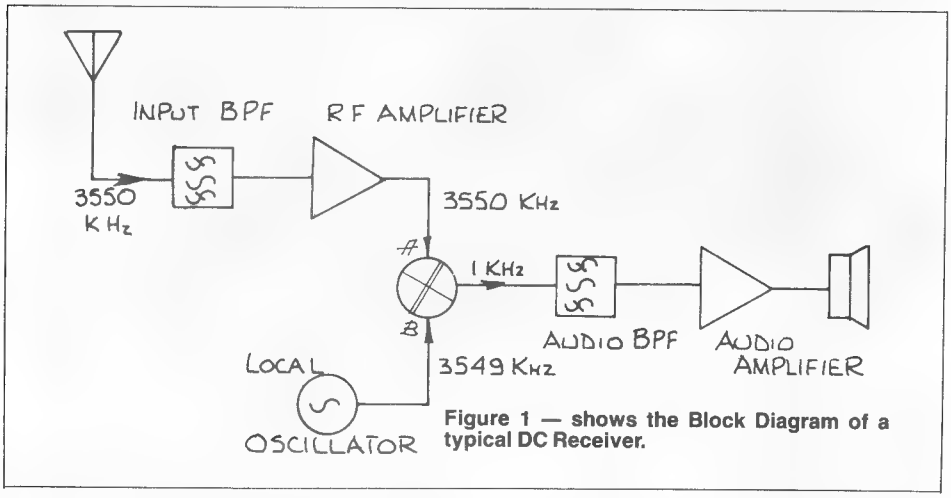


Figure 1 — shows the Block Diagram of a typical DC Receiver.

If an incoming frequency of say, 3.550 MHz is introduced to the product detector at input A, and a local oscillator LO (or beat frequency oscillator BFO) running at 3.549 MHz is introduced at input B; the sum and difference will appear at the output of the detector. The sum; 7.099 MHz is unwanted, and easily removed by filtering. The wanted product; 3.550-3.549 = 1 kHz is preserved, and is now available for further processing. This is where the term *direct conversion* comes from — the signal input frequency is *directly converted* to audio frequency.

An input band pass filter (BPF) is essential, as only the band of interest should be presented to the receiver. For example, without the filter, strong broadcast signals would enter the detector and probably cause severe overloading problems.

The RF amplifier is not a mandatory requirement, in fact some experimenters maintain that RF amplification is not necessary. Nevertheless, its inclusion will significantly improve the signal to noise ratio, and increase the overall sensitivity of the receiver. A gain which overcomes any loss in the product detector would be a minimum requirement. About 10 dB would be appropriate — any more and instability problems could occur unless very careful physical circuit layout is observed. There would also be a tendency for local oscillator energy to enter the input of the RF amplifier and cause some queer effects due to overloading, such as hum, squeaks and so on.

The audio band pass filter has a direct parallel with the tuned IF of a superhet receiver. This is where the necessary channel selectivity is obtained. The bandwidth will depend upon the reception mode required. For SSB, DSB and AM; a bandpass of perhaps 300 Hz to 3 kHz would be appropriate, whereas for CW, a bandpass of less than 500 Hz centred on about 1 kHz would be fine. In practice, to keep the receiver moderately simple, a bandpass of about 350 Hz to 2.5 kHz is employed for all modes.

Figure 2 is an attempt to show what happens as the local oscillator frequency is tuned across a portion of the 80 metre band. The cardboard cutout represents the bandpass of the audio BPF as it is moved across the signals (for clarity, all single constant frequencies).

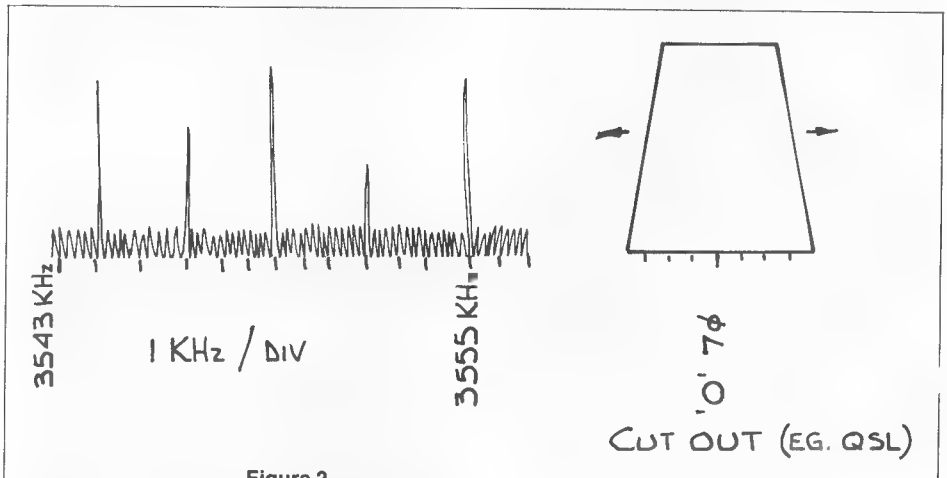


Figure 2.

The centre line represents the frequency of the local oscillator (OLO). It will be seen that it is possible to have more than one signal lying inside the bandpass simultaneously. For CW reception, this is not a big problem, as the oscillator may be adjusted to the same — or nearly the same frequency as that of the unwanted signal, leaving the wanted signal as the only audible one. The unwanted signal will now be at zero beat, or far below the low frequency cut-off point of the audio BPF, leaving the wanted signal plainly audible inside the bandpass. For SSB; an unwanted signal, on a different frequency but inside the bandpass would be audible — but unintelligible. Here the brain of the user must do the filtering. It can be shown that unintelligible interference is significantly less irritating than intelligible interference (even a stylish superhet would not eliminate an interfering signal on the same channel).

A characteristic which partly compensates for this short-coming is the 'cleanness' of the receiver response. This is very hard for me to describe. Suffice to say that signals have a purity about them, due perhaps to the simplicity of the circuitry, and the absence of multiple tuned circuits and their attendant noise impulse stretching characteristics.

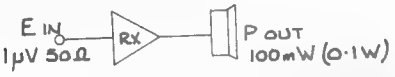
The bulk of the receiver gain must be provided by the audio amplifier. Some idea of the amount required can be shown as follows. Let's assume an input signal of 1 μV across the input impedance of 50 ohms, and a comfortable speaker power of say 100 mW:

The required 127 dB of gain could be made up of 10 dB of RF gain, perhaps 7 dB gain in an active mixer, leaving 110 dB to be provided by the audio amplifier.

Signals presented to the audio section have been derived by a minimum of processing (one RF amplifier, one mixer), so there is less likelihood that they will have become contaminated by the effects of non-linearities. Low noise op-amps of the 308, 301 and 741 families are now relatively cheap and obtainable, so an audio BPF and high gain amplifier can be built very economically using very ordinary components, in contrast to the cost and complexity of an IF amplifier with all its coils and the need for alignment.

CONCLUSION

By following appropriate design rules, it is possible for the amateur to make a receiver of very satisfactory performance with a minimum of test equipment. An avenue for construction and experimentation is thus provided which offers both beginner and 'old hand' the opportunity to contribute to the art, even with limited means.



$$Pin = \frac{E^2}{R} = \frac{1 \times 10^{-6} \times 1 \times 10^{-6}}{50}$$

$$\therefore Pin = \frac{1 \times 10^{-12}}{50} W$$

$$NdB = 10 \log \frac{Pout}{Pin}$$

$$= 10 \log \frac{0.1}{\frac{1 \times 10^{-12}}{50}}$$

$$= 10 \log 5 \times 10^{12}$$

$$= 10 \times 12.7$$

$$\therefore NdB = 127 dB$$

In a forthcoming article, we will present full construction details, including PWB layouts, for a DC receiver for 80 metres.

FURTHER READING AND REFERENCES

1. *Solid State Design for the Radio Amateur — ARRL.* This book, beautifully written by DeMaw and Hayward has become a standard work in the field of QRP, simple test equipment, receivers, etc.
2. *Practical RF Design Manual — DeMaw.* Published by Prentice-Hall; ISBN 0-13-693754-3. Despite the many typographical errors, is a valuable source covering a similar scope to (1) above.
3. *The "Mini-Monitor" Receiver — Dobbs G3RJV* in *Short Wave Magazine,* March 1984. (Rev Dobbs consistently writes informative and entertaining QRP/DC receiver related articles for SW mag).
4. *The "Beer Mat" Receiver — Hopkins and Bolton* in *Radio Communications* magazine, July 1983.
5. *Keep it Simple — Direct Conversion Receivers — Pat Hawker G3VA* Conference on Radio Receiving Systems, IERE (London), 1978.
6. *High Performance DC Receiver — Diamond VK3XU,* in *Amateur Radio* magazine, March 1984.

Definitions:

Bandpass: You don't think the musicians pay to get in do you?

Superhet: A very powerful kind of radio with the capacity to bring in many stations — most of them twice. (Apologies to M G Scroggie)

A Fiction Story, I Think . . .

Although I have been a radio amateur for 40 years, I'll never lose my love for shortwave listening. Tuning the 8-9 MHz band, for instance, is as much a thrill for me now as it was in my early years as a kid radio officer aboard a merchant tanker far at sea.

I suppose that is my explanation for so often carrying my little battery- powered shortwave receiver with me almost everywhere I go, that I can turn it on at any time to enjoy what the ether offers from so many exotic locations. Each time, it strikes me as a miracle anew, this ability to receive a distant signal propagated like it were a feat of magic beyond explanation. How many of us look at our hobby that way any more?

Well, to get on with it, one night I had fallen asleep with the earphones on, the receiver still playing a broadcast from 8.333 MHz into my ears. A strange signal, I had thought at the time, but I was tired and soon drifted off.

Hardly had I fallen asleep that I became aware of my dream, a dream in which I was walking along the cobble-stoned street of a city I quickly recognised as being Philadelphia — Market Street, in fact. I was well familiar with the spot.

But this was not 1986! No, not if the dress of those about me was an indication. They stared at my strange garb, just as I stared at theirs. Alongside me was a print shop in which a newspaper was pasted to the window. Quickly I searched for a date. June 26, 1792!

It was then I recognised myself being in a dream. This sort of dreaming is known as "lucid dreaming" in which the dreamer is not only aware of the dream but can also direct its ways. Fortunately, I have experience in lucid dreaming. I knew what to do.

Eagerly searching about me, hoping to make the best of every second of the dream, I sought to establish first hand exactly how our First Congress did, indeed, function. Thus, I turned my steps toward Independence Mall at Fifth and Chestnut Streets. I fairly trembled at the thought of seeing in person such American greats as George Washington, Benjamin Franklin, Thomas Jefferson and the others. What a rare privilege!

Heading east on Market toward Fifth, and south toward Chestnut, my quick steps brought me soon to Eighth Street where the tantalising aroma of freshly baked breads stopped me short in my tracks. Yes, aromas can be perceived by the subconscious mind in such circumstance, vividly so, I might add.

Stepping inside, I asked the price of a loaf and, being told it was three cents, shifted the receiver from my right hand to my left in order to extract change from my pocket. And then it struck me with all the impact of eternity unfolding before my very eyes — the receiver! I had it with me!

Can you imagine my dilemma? An eagerness to see the greatest personages of American history face to face, or a chance to hear if there were any signals crossing the ether at a time period more than 100 years prior to Marconi's first demonstration of the practicality of wireless communication?

We shortwave listeners never quit — I chose the receiver, stepping outside the bakery so as not to command attention.

Noting the dial to being yet set at 8.333 MHz, I held the receiver to my ear, reached for the power knob, turned it on . . . and, instantly, I heard "it," whatever it was. And then I was gone from that place.

That, my friends, is when I awoke. You see, my logical left-side brain had apparently attempted to assimilate a shock vastly beyond its capability, and to preserve my well-being it simply sent me back to reality, back to 1986 and my own bed.

But that I had heard a broadcast signal, I have no doubt. I am quite familiar with all the abnormal signals of a battery-powered radio, including the weak-battery squeal. I tell you, this was none of those — it *was* a broadcasted signal.

Often, these days, I think of 1792 and wish to be there again, but it has never come about nor do I anticipate it ever will. There is no clue remaining, neither to my conscious nor my subconscious, despite hypnotic regressions to search the past. Nothing at all, no clue, no hint at what it was that had so jarred my sensibilities that day, the something or other that was obviously so beyond my past life conditioning, beyond my range of acceptance. But, what?

I turn to all of you for help. What do you think it might have been, that radio transmission received on HF so many years before earth-men had even discovered radio?

Written by Vince Luciani K2VJ, for *CARI News* and contributed by Kevin Moore VK3ASM

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AR86

VHF UHF — an expanding world

Eric Jamieson VK5LP
1 Quinns Road, Forreston, SA. 5233

All times are Universal Co-ordinated Time and indicated as UTC

AMATEUR BANDS BEACONS

FREQUENCY	CALL SIGN	LOCATION
50.010	JA2IGY	*Mie*
50.060	KH6EQI	*Honolulu*
50.075	VS6SIX	*Hong Kong*
50.109	JD1YAA	*Japan*
52.013	P29BPL	*Loloata Island*
52.020	FK8AB	*Noumea*
52.100	ZK2SIX	*Niue*
52.150	VK0SJ	*Macquarie Island (Keyer)*
52.200	VK8VF	*Darwin*
52.250	ZL2VHM	*Manawatu*
52.310	ZL3MHF	*Hornby*
52.320	VK6RTT	*Karratha*
52.325	VK2RHV	*Newcastle*
52.350	VK6RTU	*Kalgoorlie*
52.370	VK7RST	*Hobart*
52.420	VK2RSY	*Sydney*
52.425	VK2RGB	*Gunnedah*
52.440	VK4RTL	*Townsville*
52.450	VK5VF	*Mount Lofty*
52.460	VK6RPH	*Perth*
52.465	VK6RTW	*Albany*
52.470	VK7RNT	*Launceston*
52.485	VK8RAS	*Alice Springs*
144.019	VK6RBS	*Busselton*
144.400	VK4RBB	*Mount Mowbullan*
144.410	VK1RCC	*Canberra*
144.420	VK2RSY	*Sydney*
144.430	VK3RTG	*Glen Waverley*
144.465	VK6RTW	*Albany*
144.480	VK8VF	*Darwin*
144.485	VK8RAS	*Alice Springs*
144.550	VK5RSE	*Mount Gambier*
144.565	VK6RPB	*Port Hedland*
144.600	VK6RTT	*Karratha*
144.800	VK5VF	*Mount Lofty*
144.950	VK2RCW	*Sydney*
145.000	VK6RPH	*Perth*
432.057	VK6RBS	*Busselton*
432.160	VK6RPR	*Nedlands*
432.410	VK6RTT	*Karratha*
432.420	VK2RSY	*Sydney*
432.440	VK4RBB	*Brisbane*
432.475	VK3AQU	*Melbourne (Keyer)* *
432.540	VK4RAR	*Rockhampton*‡
1296.171	VK6RBS	*Busselton*
1296.420	VK2RSY	*Sydney*
1296.480	VK6RPR	*Nedlands*
10300.000	VK6RVF	*Roleystone*

* A letter from Ian Glanville VK3AQU, reads in part — "More than two years ago I built a 432 MHz beacon which operates from my parents home in a Melbourne suburb. This is a completely 100 percent privately owned and maintained beacon. It has now been in service continuously for at least two years. It has an output power of two watts to a clover leaf antenna. It is hoped in the future to increase power to seven watts and perhaps relocate it to the hills around Melbourne.

"The beacon operates to provide a signal in the 70 cm band to the amateur community around it and provide a valuable signal for calibration and tune- ups."

I have tentatively shown this beacon as a keyer but this may not be correct so I rely on Ian to advise me further as to its actual status. I believe there are other similar beacons around which are not listed. Provided these beacons are properly set up then I see no reason why they cannot be listed even if they are privately owned.

‡ Ted VK4JTW, has written confirming the operation of the Rockhampton 70 cm beacon which has CW identification. Power output at the moment is limited to 250 milliwatts due to being solar powered from the local two metre repeater. The antenna is a four by three element NBS Yagi, horizontally polarised, phased together and pointing north, south, east and west. Ted built the beacon and reports have been received from as far away as Bill VK4LC, with Harry VK4LE, hearing it almost every morning, also most of the time being heard in Mackay. The power will be increased as soon as the new repeater is installed later this year.

A LETTER FROM JAPAN

Kuni JA2TTO, has written from Shizuoka City, Japan, where he is Editor of the Six Metre Column in the *Mobile Ham* monthly magazine and has been since 1977. He has been a member of various DXpeditions, including the 4D88UT group to the Phillipines, YB0X (being the first six metre stations from Indonesia), YB9X Indonesia Bari and HS1WR/YL in Thailand.

Firstly, Kuni says the JA6YBR beacon I have been listing in not an authorised beacon as only JARL can set up beacons in Japan. However, they are trying to obtain permission to construct and operate beacons on 50, 144 and 432 MHz. Therefore, I have duly removed the station from the beacon list for the time being.

Also enclosed was a very neatly set out DXCC listing for countries worked on six metres and this will be included in the next listing which comes out in February 1987. As the list arrived too late for the August 1986 listing I am sure it will be of interest to readers to know that 48 countries are listed, made up as follows:

1. 7J1RL Okino-Tori-Shima 30/5/76 1057 UTC
2. VK3OT Australia 7/4/77 0815 UTC
3. JE1AHS/JD1 Ogasawara 1/5/77 1010 UTC
4. JD1YAA Minami-Tori-Shima 1/5/77 0907 UTC
5. HL9WI Korea 11/5/77 0910 UTC
6. KL7HAM Alaska 15/5/77 0255 UTC
7. KG6DX Guam 22/6/77 0200 UTC
8. P29HV Papua New Guinea 3/12/77 1628 UTC
9. 3D2CM Fiji 23/3/78 0647 UTC
10. YJ8KM New Hebrides 1/4/78 1023 UTC
11. FK8AX New Caledonia 23/4/78 0639 UTC
12. VS6HK Hong Kong 1/5/78 0241 UTC
13. CR9AJ Macao 1/5/78 0306 UTC
14. VK9ZR Mellish Reef 7/10/78 0932
15. KH6IJ Hawaii 3/11/78 0445 UTC
16. WA6JRA USA 28/2/79 0007 UTC
17. LU5EMM Argentina 2/3/79 0056 UTC
18. FO8DR French Polynesia 19/3/79 0832 UTC
19. KC6IN Eastern Caroline Islands 31/3/79 1111 UTC
20. PY1RO Brazil 12/3/79 0245 UTC
21. KG6RO Mariana Island 31/3/79 1422 UTC
22. KX6BU Marshall Island 26/4/79 1121 UTC
23. YB0X Indonesia 7/5/79 1131 UTC
24. C21NI Nauru 10/8/79 1107 UTC
25. HS1WR Thailand 1/9/79 1253 UTC
26. 5W1CF Western Samoa 13/9/79 1006 UTC
27. KC6SZ Western Caroline Islands 12/10/79 1417 UTC
28. ZL1AKT New Zealand 27/10/79 1102 UTC
29. VE7AXY Canada 18/11/79 0012 UTC
30. A35DX Tonga 9/5/80 0905 UTC
31. K9PNT/DU2 Philippines 3/3/80 1228 UTC
32. VK9XT Christmas Island 14/3/80 1226 UTC
33. N6DX/NH8 American Samoa 23/4/80 0916 UTC
34. VK9ZG Willis Island 25.7.80 1156 UTC
35. T3AZ Western Kiribati 17/9/80 1045 UTC
36. EL2FY Liberia 10/10/80 2358 UTC
37. VS5LH Brunei 17/11/80 0207 UTC
38. 9M6BE East Malaysia 30/11/80 0114 UTC
39. ZB2BL Gibraltar 23/2/81 0109 UTC
40. VU2JPN India 8/3/81 0516 UTC
41. KH3AB Johnston Island 21/3/81 0013 UTC
42. FW0BK Wallis Island 12/9/81 0901 UTC
43. H44PT Solomon Islands 15/9/82 1015 UTC
44. XU1SS Cambodia 22/8/83 0840 UTC
45. ZK2RS Niue 21/3/84 1005 UTC
46. BT5RA China 18/8/84 0022 UTC
47. ZL8AFH Kermadec Island 7/4/84 0242 UTC
48. Any station in Japan!

No doubt you will find it very interesting to go through this very impressive list and compare it with what you may have worked. Of interest too is that most of the more exotic contacts took place in 1978/79/80, with the peak year 1979. Based on the 11 year solar cycle, one could expect to start hearing long distance stations again around 1989 with a few even earlier. The equinoctial periods March/April and September/October seem to have provided the most contacts, a fact which was born out here too. There were 19 contacts on CW, the rest were on SSB. There were a few weak signal reports but most were shown as 5 x 9. All six continents are included.

The list of countries in the July 1986 issue, which had been worked by Graham VK8GB, includes a few not so far worked by Kuni JA2TTO, those being Lord Howe Island, Norfolk Island, Cocos Island, Venezuela, St Helena, Kenya, Nepal and Trinidad. It is interesting to reflect that there are still variations between two good locations and those extra worked by Graham are not necessarily at his back door.

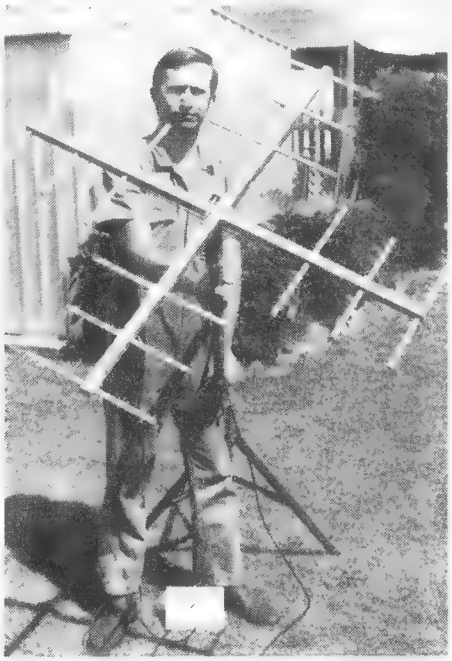
Other information tendered by Kuni mentions a new station from China on six metres, BY4RB, at Zhenziang, near BY4AA and operational from June 22, 1986, using a TR9300 and seven element Yagi after receiving instructions on VHF operation from JA1UT. As a result, BY4RB contacted about 1000 JAs on six metres between 22/6 and 26/6 on Es. BY1PK and BY4AA were both worked on 21/6 and 22/6.

From Korea the following are active on six metres: HL1IE, EJ, JD, PM, TS, AQK, AJY, ACK, ASS, HL2ICB, DCE, GS, HL4HAB, CCM, HL5BNV, BIT, HL0S.

Kuni has indicated he would like to exchange information with me so we should be able to learn more about what happens to our north where there are quite a number of countries with six metre operators.

NORTH QUEENSLAND

Ted VK4JTW, from Rockhampton, reports regular scheds are maintained to the west from Rockhampton on 144.200 at 2015 UTC, every day, between Harry VK4LE and Joe VK4AEW, with



Ted VK4JTW, with his 70 cm Beacon Antenna.

others calling in. Signals are usually around 5 x 5 on two metres and 5 x 2+ on 70 cm.

Regular stations on SSB include VK4AEW, VK4LE, VK4KTA, VK4TPK, VK4KAL on two metres with VK4JTW and VK4ZHL on both two metres and 70 cm. Further north at Mackay, there are VK4AIV, VK4AIM and VK4ALW on both bands.

On weekends, Ted VK4JTW and Errol VK4ZHL, are on to Brisbane on 144.350 and 432.350 MHz from 2030 with 3.620 MHz as back-up. Signals to Angus VK4AGQ, range from 5 x 3+ to no copy on bad days on both bands. Tony VK4AJB, is a regular on 70 cm to Rockhampton with signals 5 x 3 to 4 x 1 from Gympie. Contacts to Mackay range from 5 x 5+ on 432.100, one watt FM, but mostly 5 x 1. SSB high power with Wally VK4AIV, means regular contacts.

VK4AEW uses a TR9000 with pre-amplifier and 100 watt home-brew valve linear into two nine element Yagis. At VK4ZHL a TR9130, with Microwave Modules pre- amplifier and 160 watt linear into two 13 element quagis on two metres, on 70 cm a TR9500 to 100 watt linear and 15 element quagi. VK4LE has a HL160V into five by five element Yagis on two metres and a TR9500 into a HL90U linear, 10DFB cable and four 11 element Yagis on 70 cm. Wally VK4AIV, has a 25 element loop Yagi fed by heliax from a IC471H on 70 cm and IC271H on two metres.

The station of VK4JTW on two metres has a FDK750 into 150 watt home-brew valve linear with 12 element NBS Yagi and masthead pre-amplifier, on 70 cm a TR9500 into MRF646 home-brew amplifier giving 40 watts into a 23 element DL6WU antenna fed with 10DFB. Ted is making three more DL6WU antennas as well as a 4x150A coaxial linear for 70 cm and hope to have an output of about 175 watts.

OVERSEAS

The Short Wave Magazine for May 1986, courtesy Steve VK5AIM, reports amongst other things, the 156 mph gust of wind recorded in Scotland on March 20, 1986 and further south at Luton airport of 88 mph. Much destruction of antennas occurred, naturally. I would hope never to ask my antenna system to withstand 156 mph winds!

In the same month, the RSGB National VHF Convention was held at Sandown Park Racecourse with an attendance around 3000! No wonder the comment was made that at times it was necessary to fight your way to the various stalls.

Much interest centred around the equipment available for 50 MHz now that the band has been made available to the G-stations. Of particular interest was a new MMT50/144 transverter which needs between 150 mW and 15 watts to drive it and gives an output power of 20 watts. Used with a 7 dB antenna gain this gives the maximum licenced ERP presently permitted. The suggested price was £145 and was in direct competition with the muTek TVVF50c currently offered there at £209.90. I wonder if we will see any of these units in Australia?

A comment from the same magazine was that the six metre band so far had proved it is much easier to work stations via meteor scatter and aurora than it is on two metres. However, tropo propagation is much poorer. For example, G4FRX, in Hampstead, regularly works G4OAE, in Reading, on 70 cm using a few watts, signals being rock steady and very strong. But on six metres signals are weak and always accompanied by lots of noise, even though the distance is only about 50 km. The general conclusion is that six metres is the noisiest VHF band with thermostat and motor commuter hash, and all the domestic clicks and bangs peaking around 50 MHz. "Perhaps this explains why so few stations are using the band now that the initial novelty has worn off."

Whilst I concede six metres can be relatively noisy, I do question why better results are not being obtained from "two stations both well sited with a relatively clear path and only 50 km apart." There must be something wrong at one or both stations for poor reports to be obtained over such a short distance from good sites. VK5LP, can put an S9 signal into Adelaide over a similar path distance with three watts from my relatively poor location. With 20 watts it should be a push-over at 50 km for S9+ signals on six metres so another look at their antenna systems might be in order if the other equipment is working satisfactorily, especially so, since they both have good sites. The other factor is that it is a new band to these people and they still have to get their acts together for best results.

The Annual VHF/UHF Table for operation between January 1, 1985 and December 31, 1985 showed G0CUZ as having worked 16 countries on two metres with four other stations working 14; on 70 cm G1KDF worked six countries and G4NBS worked seven; on 23 cm G1KDF worked three countries. These were the top scorers in a listing of 24 participating stations. G4SFY, had 130 CW contacts on two metres.

IC551D MODIFICATION

For those of you who have an IC551D (and I presume the lower power IC551) you may be interested in a modification to the noise blanker which is supposed to affect quite an improvement. The tip is published in the SMIRK *Six Shooter* newsletter of May 1986 and came originally from KLM Electronics.

1. Break apart Q13 exposing leads that go to the PC-board.
2. Using a 2N2222 with leads cut short, connect it to the leads where Q13 was.
3. Cut the long lead of R86 leaving enough lead so another resistor can be soldered in series with R86.
4. Connect an 82 ohm half-watt resistor in series with R86.
5. Using a signal generator tuned to 50.100 MHz connected to the IC551 input — adjust L25, L23, L22, L21 and L20 for maximum S-meter reading.
6. With the IC551D connected to an antenna adjust L19 and R65 for the best noise blanker operation. R65 can be pre-set at half-turn.

With my IC551 I found the adjustment of R65 to the optimum point when power line hash is at its worst did make an improvement in the ability of the rig to lower the noise level in most cases. (This was a separate operation and nothing to do with the above modification). However, due to one particularly bad insulator on the 22 kV line outside my shack during our long dry summer last year eventually the noise blanker was unable to cope so contacts on six metres were wiped out. I substituted my trusty old TS600, which I use for portable operation and the superior blanker in that equipment enabled me to carry on satisfactorily on the band. It grieved me to have to resort to this as all other points about the IC551 are so good but why they cannot produce a blanker as good as the one in the TS600 is beyond me. However, before this summer, I will try the above modification and let you know what the result is. In the meantime, of course, the Electricity Trust has been good enough to replace the offending insulator and clean all the others so it may need a very hot day before the level rises high enough for problems to occur this year! Incidentally, before the substitution of the TS600 the power leak was reading S9 +30dB on the IC551 and a few minutes later on the TS600 it was S2 (or S9 + 30 with the noise blanker switched off, so there was no change in the actual conditions).

If any reader does make this modification I would be pleased to hear what results you obtained so I can pass the news along.

THE ROSS HULL MEMORIAL CONTEST

Quite a degree of activity has been taking place in various quarters in an effort to keep the Ross Hull Contest alive. As you know, it has come under threat of extinction by the Federal Contest Manager due to lack of log submissions, etc.

The FCM sent a circular to a number of interested parties, including myself. As a result, I have made a number of interstate telephone calls and posted out suggestions for possible improvements and there has been some interesting feedback, and a few of the main points are set out below.

1. There seems little doubt one of the main inhibiting factors causing most operators not to send in logs are the stations operating on six or more bands. No one talks disparagingly about these stations, in fact, they command the dedication necessary to achieve this situation and the effort required to fire-up on so many bands with such consistency, that they do in the Contest. But not everyone can achieve this status for a variety of reasons so what we are hearing is why can't we have a contest in which there is a more even chance for the maximum of stations? If the contest for the trophy was limited to 52, 144 and 432 MHz with bands above being able to operate for a certificate in each call area, then it would get back to something like it was years ago when there was a much higher return of logs. In other words, years ago almost no one had equipment for 1296 and above, so it was, by nature, limited to those three bands anyway.
2. The one point per contact irrespective of distance did not go down too well either and certainly it did not recognise that there are stations 2000 km and further with whom it would not be easy to make a contact particularly on two metres so it was easier to ignore such operators and stay on six metres. But operators nevertheless still want a relatively easy scoring table.
3. The bonus system failed because it was more valuable to go for prefixes than attempt to work stations in areas already worked. Something which gave a bonus after, say, every ten contacts would tend to keep people on the air.
4. Some thought no contacts should be permitted under 50 or 100 km. This does have some merit if applied across the whole spectrum of bands, but up to 70 cm it could be unfair in a situation such as, with a 50 km limit, you had one station at 60 km from a metropolitan area, he could work perhaps 50 stations in that area, but those stations residing in the metropolitan area each could only work the one station. So the lone station would score say 50 points for his work and the others one point. On the other hand, they would be free to work stations elsewhere!
5. Some recognition was needed for working stations on other countries or the islands of the Pacific. If these operators from ZL, P29, H44, FK8, etc are good enough to come on and provide contacts then they and the operator working them need to receive more than one point. Five points per contact on six metres to these stations would not be considered unreasonable. Likewise, contacts over 2000 km across the Australian mainland should have some consideration too — often they are not easy.
6. Some doubted the need for a score taken over the full Contest period saying that a seven day and two day section would suffice. It was pointed out that stations would still stay on the maximum time they could because with Es contacts, one cannot predict what is going to happen on the VHF bands, therefore you need to be on to arrive at your best seven day score.

That summarises the main points arising from correspondence and discussions. I will now be taking the matter up with the FCM in an endeavour to ensure the Contest is available to us this year. At the same time, I expect you, the operators, to play your part by submitting a log and not cut the ground from under my feet. I don't have much to stand on if there are only a few logs, as last year. The FCM advises me that from the log entries he received, there were only about 60 VHF stations which had operated on the six metre band. The copies of the logs of the stations from whom I had requested revealed there were 402 separate call signs from VK1 to VK8 inclusive. There were 166 call signs on two metres. The breakdown of this information I published in March 1986 *Amateur Radio*. These figures show a great deal of interest, but this was not reflected in the log returns.

If the Contest has its main feature as being of seven days duration then no one needs to be too concerned if you work someone who gives you a score exchange which indicates he may have worked 500 stations. Because he selects his best seven days you may have just as good a chance.

On getting the logs ready for the FCM, why not do as I do and write your log entries in your log book neatly and then photocopy them after which you can add the extra details such as scoring, etc before submitting them to the FCM. It is unlikely you will be working stations any time at such a furious rate that you cannot keep your log book neat. A little time spent during the Contest will

save you much time later, especially if you have a good score. But ***please*** — enter the log. (If you use a black pen photocopies are much darker and easier to read. Blue does not photocopy well).

FINALLY

There is not a lot to report on the overall winter time activity on our bands. There seems little point in reporting general day to day contacts and I have not heard of anything too spectacular o far this month! I have a very annoying problem in that my two metre rotator is frozen in a south-easterly direction and all efforts from the ground have so far failed to free it. David VK5KK, climbed up 70-odd-feet recently and reported everything looked okay but as it was very windy we could do no more. I am hoping the warmer weather of approaching summer might free it, in the meantime, I have to be content with using the system to monitor VK5RSE, the beacon in Mount Gambier, on 144.550 MHz!

Closing with two thoughts for the month: *Inflation is prosperity with high blood pressure* and *Advice is like mushrooms. The wrong kind can prove fatal.*

73 The Voice in the Hills.

VHF/UHF RECORD CLAIMS

A number of VHF/UHF distance record claims have been received by FTAC over recent months. Because of the workload leading up to the Federal Convention, analysis of these applications has only now commenced.

Initial analysis of the claims shows the following:

CALLS	BAND MHz	DATE	DISTANCE	RECORD
1. VK7DC/VK5LP	432	Jan 11, 1985	918 km	VK5/VK7 record
2. VK7JG/VK5NY	432	May 21, 1985	995 km	VK5/VK7 record
3. VK5ZEE/ZL1HH	144	Jan 15, 1986	3458 km	VK5 State record
4. VK3KAJ/VK3ZBJ	3300	Jan 25, 1986	246 km	Australian record
5. VK3KAJ/VK3ZBJ	10000	Feb 8, 1986	262 km	Australian record

Once final verification is made, these applicants will be formally advised of the status of their record applications.

In addition, claims have been received from Wally Green VK6WG, and Brian Usher VK5KBU. Unfortunately, in both cases, insufficient information has been received to make the necessary analysis and verification possible. These applicants have been contacted to obtain the extra details necessary.

Any intended applicants for VHF/UHF records are urged to include all details specified on page 143 of the 1985-1986 Call Book. Such will ensure early verification and public recognition of the record.

Ray Roche VK1ZJR, VHF/UHF Claim Recorder, Federal Technical Advisory Committee.

Contributed by Peter Gamble VK3YRP

Contests

Ian Hunt VK5QX
FEDERAL CONTEST MANAGER
Box 1234, GPO, Adelaide, SA. 5001

CONTEST CALENDAR

SEPTEMBER

- 7	LZ DX Contest (Rules this issue)
6- 7	Tenth WA Annual 3.5 SSB Contest (Rules August issue)
13-14	European Phone Contest (Rules August issue)
20-21	Scandinavian CW Activity
27-28	Scandinavian SSB Activity
27-28	1986 Californian QSO Party (Rules this issue)

OCTOBER

4- 5	VK/ZL Oceania Phone Contest (Rules August issue)
4- 5	IRSA World Championship
11-12	VK/ZL Oceania CW Contest (Rules August issue)
-12	RSGB 21/28 MHz SSB Contest
15-17	YLRL Anniversary CW Party
-18	RSGB 21 MHz CW Contest
18-19	1986 Fall CW Contest (Rules August issue)
18-20	CARTG RTTY Contest
25-26	CQ WW DX Phone Contest
29-31	YLRL Anniversary SSB Party

NOVEMBER

- 8	Australian Ladies Amateur Radio Association Contest (Rules this issue)
8- 9	European RTTY Contest (Rules August issue)
29-30	CQ WW DX CW Contest

ALARA CONTEST

Well, here is the big event on the YL calendar and I certainly believe that all OMs should note this contest as well.

The rules have been provided to me by Marlene VK2KFQ, and I thank her for same. The ALARA Contest should be a friendly event and I hope that all will provide it with the support that it deserves. It will also provide chances for gaining some of those special awards for which YL contacts are needed.

I see that my compatriot, Frank W1WY, of *CQ* magazine fame, has also publicised this contest in his column. I wish all who enter an interesting and enjoyable contest and hope to find some time to enter myself. Further, I would remind ***all Australian YL Novice Operators*** of the Florence McKenzie CW Trophy. Check the rules properly for details.

It is of note at present that we have, here in VK5, a YL operator, Jennifer VK5***A***ustralia's ***N***icest ***W***oman, as our Divisional President. So, go to it Jennifer, in this special year for the VK5 Division. I know that you will have at least all the VK5s backing you to win the Contest!

CONTEST DATES FOR 1987

I have now allocated dates for the forthcoming year in accordance with prescribed guidelines. I trust that in doing so I will have been able to stay clear of any major overseas HF contests. However, I have no real way of telling. It is necessary that thee dates be set at about this time for various reasons. Details are as follows:

Ross Hull Memorial VHF Contest, 1986 — December 13, 1986 to January 5, 1987
John Moyle Memorial Field Day Contest — March 14-15, 1987
VK Novice Contest — June 27-28, 1987
Remembrance Day Contest — August 15-16, 1987

I would presume that the VK/ZL Contest will be held as usual on the first and second in October.

It should be of interest that as a result of negotiation with Jock White ZL2GX, who is the NZART Contest Manager, agreement has been reached that the ZL Field Day Contest will be conducted on the same weekend as our Field Day. Also, that it is likely that the ZL Memorial Contest will coincide with our Remembrance Day Contest. Discussions which have taken place make it appear quite feasible for both VK and ZL stations to operate simultaneously in virtually both contests using common scoring exchanges. This will require only minor changes or additions to our contest rules and should be of benefit to all operators. It may also attract added interest in these contests. Further details will be made available when the rules have been finally approved and are ready for publication. I would like to express my thanks to Jock for his great tolerance and patience whilst we negotiated these matters. It is a fact that he was prepared to make the maximum of changes to meet this desirable state of affairs whilst I was probably just my usual stubborn and inflexible self. (Actually, all it took was a motor car drive around Adelaide and one free meal to bribe him whilst he was here. Then again, on second thoughts, maybe my driving scared him so much he was frightened to say no!).

The subject of rules for the Ross Hull Contest, as well as the future of same has been under close scrutiny. A great deal more feedback is needed from members than has resulted so far from the Discussion Paper which I have circulated, before we can come to any rational decision as to the prevailing opinions. At the same time, several persons have been working to try and devise a set of rules which may suffice for the present. If the modified rules can help increase interest in the Contest, well and good. If not, then something will have to be done about the situation. No matter which road one takes however, it will never be that everyone is pleased with the rules for contests.

I would ask that you do please continue to send in your comments connected with contest matters. Whilst I cannot undertake to reply to all letters I can assure you that your comments, for and against, are appreciated.

You may have noticed a mistake in the headings for the results of this year's *John Moyle Memorial Field Day Contest.* The results for the ***six*** hour section were headed eight hour. This was a mistake and I can assure you that there is no intention to vary the six hour period which has proven popular for a number of years.

Incidentally, earlier in these notes I mentioned the name of Frank Anzalone W1WY. Frank provides me with regular copies of his contest material and I know that he sends out the same to over 20 organisations around the world on a personal voluntary basis, and at no profit. Frank has been with *CQ* magazine for over 30 years. That could be some kind of record.

HF CONTEST CHAMPIONSHIP

I have great pleasure in finally announcing the winners of this competition for 1985. I have scored the results on the basis of the rules as published in the August issue of *Amateur Radio.* This means that for the first time we have separate Contest Champions for the Phone and CW modes. I have provided details below in which, although to qualify for the competition entries need to be made in *three* of the four applicable contests, I have included scores where entrants have points in two or more. There were quite a few stations who scored high points in just a single contest. If some of these stations, particularly novice stations who did well in the VK Novice Contest were prepared to enter in the Field Day and Remembrance Day Contests, we could see some quite interesting results in this particular competition.

Congratulations are due to ***Bob VK5BJA***, for his win in the Phone Category, and particularly to ***Jim VK2BQS***, for top scoring in the CW Category. Both operators always have submitted good logs and Jim has been a most consistent entrant in contests for a number of years.

I have not at this stage completely sorted out

matters concerning the main trophies as yet. However, both entrants can expect to receive their smaller individual trophy for their retention in due course. The existing trophy has to be sent for refurbishing whilst the second trophy has yet to be obtained.

CALL SIGN CONTEST AND TROPHY POINTS

	JM MFD	Novice	VK ZL	RD	Total
					PHONE CATEGORY
5BJA	10	10	—	10	***30***
2KL	—	9	10	10	***29***
5QX	10	9	—	9	***28***
2BQS	—	6	10	—	***16***
3ADW	9	—	—	3	***12***
1LF	—	—	8	3	***11***
4BKM	—	—	6	4	***10***
					CW CATEGORY
2BQS	10	9	7	—	***26***
2PS	—	10	10	—	***20***
5AGX	—	10	—	9	***19***
4XA	—	—	8	10	***18***
5GZ	—	9	2	6	***17***
3KS	—	8	8	—	***16***
3RJ	—	—	9	3	***12***

The observant amongst you may have noted an anomaly, in that Lindsay VK5GZ, actually took second place in the CW Category with his 17 points as he was the only station entered apart from VK2BQS, who scored in three of the four contests.

Finally, in my notes for this month, I wish to acknowledge the receipt of correspondence from Robb VK4TKA, Eric L30042 and a letter I had inadvertently overlooked from Ewen VK3BMV. This latter I will reply to as soon as possible. I also received another very nice letter from Arthur Mead, of Bexley, NSW.

As these notes are written, there is just over a week to go to the closing date for the VK Novice Contest. Logs have been rolling in at a pretty fair rate and a quick preview of comments indicates that it was possibly one of the most satisfactory Novice Contests so far conducted. It would appear that the time of the year finally achieved for this contest is right.

I hope that you had a good time operating in the Remembrance Day Contest and I am looking forward to having exchanged serial numbers with you in the contest. Meantime, my greetings to you. I trust that all your antennas have managed to weather the winter storms and have not deteriorated too much from the cold and wet. Best 73 de Ian VK5QX.

ALARA CONTEST

ELIGIBILITY — All licenced operators throughout the world are invited to participate. The Contest is also open to SWLs.

OBJECT — The object of the contest is participation! YL works everyone, OM works YLs only. One contest (combined phone and CW) run over 24 hours.

PERIOD — Starts 0001UTC Saturday, November 8, 1986 to 2359UTC Saturday, November 8, 1986.

SUGGESTED FREQUENCIES — bands to be used are: 3.5, 7, 14, 21 and 28 MHz only. The following are suggested frequencies for easier location of contacts.

PHONE	CW
28.480-28.520 MHz	28.100-28.200 MHz
21.180-21.200 MHz	21.100-21.200 MHz
21.350-21.370 MHz	14.050-14.060 MHz
14.180-14.200 MHz	7.010- 7.020 MHz
14.280-14.300 MHz	3.525- 3.535 MHz
7.100- 7.120 MHz	
3.570- 3.590 MHz	

OPERATION — Phone and CW operation. Each station may be counted twice on each band for credit: once on phone and once on CW. All contacts must be made in accordance with operator and station licence regulations. No net or list operation, no cross-mode.

PROCEDURE — Phone: Call ***"CQ ALARA CONTEST"***. CW: Call ***"CQ TEST ALARA"***.

EXCHANGES — ALARA member: RS or RST, serial number, starting at 001, ALARA member, name. YL non-member or OM: RS or RST, serial number starting at 001, name.

SCORING —

Phone: Five points for each ALARA member contacted. Four points for a YL non-member contacted. Three points for OM contacted.

CW: Double all points for CW contacts.

SWL: Five points for ALARA members logged. Four points for YL non-members logged.

LOGS — Single log entry (but Australian YL Novices entering for the Mrs Florence McKenzie CW Trophy should indicate their CW score separately, also). Logs must show date/time UTC, band, mode, call sign worked, report and serial number sent, report and serial number received, name of operator of station worked, and points claimed.

SAMPLE LOG

Date Time UTC	Band MHz	Mode	Call Sign	RS/T & Serial No Sent	RS/T & Serial No Rec	Name	Point
0135	28	SSB	VK3KS	59001	59002	Mavis	5
0138	21	CW	VK2EBX	599002	590010	Joy	10

LOGS MUST BE SIGNED — Logs to also show full name, call sign and address of operator, and show final score (points claimed). Logs must be legible. No carbon copies. No logs will be returned. Decision of the Contest Manager will be final. Logs must be received by the ALARA Contest Manager by December 31, 1986.

CONTEST MANAGER — ALARA, 31 Cadell Street, Wentworth, NSW. 2648, or PO Box 4, Middle Brighton, Vic. 3186.

A TROPHY — Will be awarded for the highest aggregate score over five years (commencing 1983) of a licenced YL operator (not necessarily Australian.

MRS FLORENCE MCKENZIE CW TROPHY — This will be awarded to the Australian YL Novice operator with the highest CW score (not necessarily an ALARA member). Minimum score 50 points. The actual trophy, because of the size and weight, will not be forwarded to the winner, but a certificate bearing a photo depicting the trophy, will be sent to the winner each year.

CERTIFICATES — Will be awarded for the following:

Top overall score
Top score Australian YL Novice (Mrs Florence McKenzie Certificate)
Top ALARA member score in each country and VK call area
Top YL non-member score in each Continent
Top OM score in each Continent
Top SWL score in each Continent
Top VK Novice score
Top Overseas YL Novice score — CW

(Mrs Florence Violet McKenzie, 1892-1982, was the first woman in Australia to take out a transmitting licence, in 1921. She passed the Amateur Operator's Certificate of Proficiency in 1925, and obtained the call sign 2GA, later VK2FV. Mrs Mac taught Morse code to thousands of people, particularly service personnel, during the 1939-45 war years. In 1984, the Townsville Amateur Radio Club kindly donated a trophy in her memory).

1986 CALIFORNIAN QSO PARTY

Sponsored by the Northern Californian Contest Club

The Contest is held from 1600 UTC, September 27, 1986 to 2200 UTC, September 28, 1986.

Single operator entries may operate only for 24 hours; off times must be clearly marked in your log and must be at least 15 minutes long.

Multi-operator entries may operate for the full 30 hours.

Stations may be worked once on CW and Phone on each band.

All contacts must be simplex, no MCW.

All CW contacts must be made in the CW subband, except for 160 metres.

Californian stations that change counties are considered to be new stations and may be contacted again for point credit.

OBJECT — Stations outside of California work as many Californian stations in as many Californian Counties as possible; stations in California work anyone.

EXCHANGE — Californian stations send a QSO number and county, stations outside California send QSO number and State/province/country.

QSO POINTS — Each complete phone contact is worth two QSO points. Each complete CW contact is worth three QSO points.

MULTIPLIERS — Stations use the number of different Californian Counties for a possible total of 59.

TOTAL SCORE — The total score is the number of QSO points multiplied by the total number of multipliers.

FREQUENCIES — 160 metres through to two metres, excluding 30 and 12 metres. CW on 1805 and 50 kHz up from the band edge. Phone on 1.815, 3.850, 7.230, 14.250, 21.300 and 28.500 MHz.

Try CW on the half hour, 160 metres at 0500 UTC and 80 metres at 0700 UTC.

LOGS — All logs and summary sheets must be sent to NCCC, c/- Gary Caldwell WA6VEF, 1830 Polk Street, Concord, CA. 94521, by November 1, 1986. Please include a business size SASE for results. Entries of more than 200 QSOs must include duplicate sheets.

AWARDS — Certificates to the highest scoring single operator entry in each country and each station that scores 100 or more QSOs. Trophies will also be awarded.

LZ DX CONTEST

The Bulgarian Federation of Radio Amateurs invites amateurs world-wide to participate in the *LZ DX Contest*.

The contest is held on the first Sunday of September from 0000 to 2400 UTC. (September 7, 1986).

BANDS and MODES — 3.510-3.560; 7.000-7.040; 14.000-14.060; 21.000- 21.080; 28.000-28.100 MHz, CW only.

CATEGORIES —

a) Single operator all bands
b) Single operator one band
c) Multi-operators, club stations, all bands only
d) SWL.

EXCHANGE — RST and ITU zone of the transmitting station.

POINTS — Each confirmed QSO with an LZ station is six points. One point for a QSO with stations in the same continent. Three points for all other QSOs. One station may be worked only once per band.

MULTIPLIER — The sum of the number of ITU zones on each band.

FINAL SCORE — The sum of the QSO points from all bands multiplied by the final multiplier.

SWL — Three points for two call signs and two numbers; one point for two call signs and one number.

LOGS — In standard format, separate logs are required for each band. Summary sheets showing zones worked on each band and a declaration are required. Send logs not later than 30 days after the contest to: Central Radio Club, PO Box 830, Sofia 1000, Bulgaria, Europe. The postmark will be decisive.

Awards in the form of medals will be awarded to the winners.

Logs may be accompanied with an application for the BFRA Awards — NRB, W- 100-LZ, Five-Band LZ, W-28 Z ITU, Black Sea Award and the Sofia Award. (See Awards Column for details of these awards).

THE 28th SCANDINAVIAN ACTIVITY CONTEST 1986

CW: September 20, 1500 UTC to September 21, 1800 UTC.

Phone: September 27, 1500 UTC to September 28, 1800 UTC.

Logs to: EDR Contest Manager, Leif Ottosen OZ1LO, Bankevejen 12, Kong, DK-4750 Lundby, Denmark.

Aims: To encourage activity on the part of Scandinavian and non- Scandinavian amateurs to work each other and to promote communication skills between amateur stations world-wide. Non-Scandinavian stations will try to work as many Scandinavian stations as possible.

Scandinavian stations are defined by prefixes as follows: LA, LB, LG, LJ Norway; JW Svalbard and Bear Island; JX Jan Mayen; OF OG, OH, OI Finland; OH Aland Island; OH0M Market Reef; OX

Greenland; OY Faroe Islands; OZ Denmark; SJ, SK, SL, SM Sweden and TF Iceland.

Eligible Entrants: Radio amateurs as well as SWLs world-wide are invited to participate.

Sections:

a. Single Operator/Single Transmitter/All bands only and Single Operator/Single Transmitter/All bands QRP. A single operator is one person performing all operating, logging and spotting functions. QRP operators may use stations with a maximum input of 10 watts.

b. Multi-Operator/Single Transmitter? All bands only. Only one signal allowed at any time on any band. The station must remain on the band at least 10 minutes after the first QSO on that band after a band change.

c. SWL. Only single operator/All bands. Log must contain Date, Time UTC, Band, Scandinavian Station Heard, Message Sent by Scandinavian Station, SWLs own report, Station Worked by Scandinavian, Multiplier, Points. Only Scandinavian stations may be logged for points. Scoring as for transmitting sections.

Bands: 3.5, 7, 14, 21, 28 MHz according to IARU Band Plans. NOTE: 3.560-3.600; 3.650-3.700; 14.060-14.125 and 14.300-14.350 Mhz must be kept free of contest traffic.

Exchange: Consists of RS/T plus serial number beginning at 001. QSOs after 999 are numbered 1000, 1001, etc. The same station may be worked once on each band. Only CW/CW and Phone/Phone QSOs are valid.

Scoring: Two-way QSO with a sent and received exchange counts for QSO points. Stations credit their log with one point for every completed Scandinavian QSO on 14, 21, 28 MHz and with three points for QSOs on 3.5 and 7 MHz.

Multipliers: Worked call-number areas (0 to 9) are valid on every band in each Scandinavian country. Portable stations without a district number counts for the 10th area; eg G3XYZ/LA counts for LA0. OH0 and OH0M are separate call areas. SJ9 counts for the ninth call area in Sweden; eg SM3-SK3-SL3 count as one multiplier — not three multipliers on each band).

Final Score: Multiply the sum of QSO-points on all bands with the sum of multipliers worked on all bands.

Logs: Must be post-marked no later than October 30. Signed original logs, or copies of original logs, must be submitted separately for CW and Phone. Logs to be filled out in the following order: Date, Time UTC, Station Worked, Sent and Received Exchange, Band, Multipliers; (eg OZ4, SM3, OH0, etc) and points.

SWL log must contain: Date, Time UTC, Band, Scandinavian Station Heard, Message Sent by Scandinavian Station, SWLs own Report, Station Worked by Scandinavian Station, Multipliers and Points.

All entrants must contain a summary sheet showing station call sign, category, name of operator/s and address. Indicate number of QSOs per band less duplicates, number of duplicates per band, multipliers per band, QSO points per band and final score.

All entrants must also supply a multiplier sheet for each band with more than 200 QSOs.

Possible duplicate QSOs must be shown in the log and count for zero points. Each entrant must submit a duplicate QSO sheet for each band with more than 200 QSOs.

Declaration: By his/her signature on the summary sheet the participant declares that all rules are observed and that the station was operated in accordance with the rules and regulations for amateur radio stations in the country of the participant.

Usual contest disqualification criteria applies.

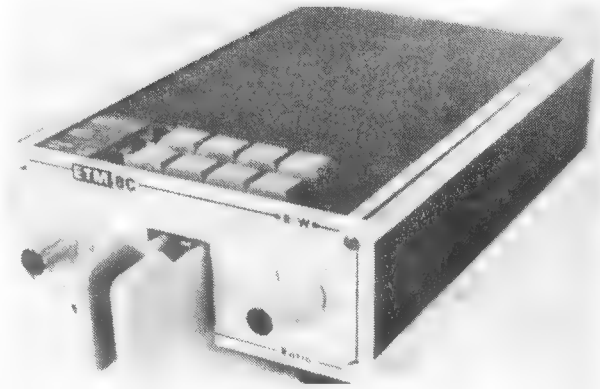
Top scorers in each country will receive awards and certificates, etc.

The 29th SAC in 1987 will be organised by the SRAL, Finland.

HAMADS are a free service to members of the WIA!

ELECTRONIC KEYERS

Gil Griffith VK3CGG
7 Church Street, Bright, Vic. 3741



Photograph courtesy *Keylink Imports* (see advertisement page 55)

The many inquiries I have had after the article on the ETM-8C keyer in July AR has provoked me into a better explanation of electronic keyers as I have found them.

I will attempt to put my meagre two years of learning about them into this article, but it will be in plain English translation as I am still having trouble following the logic circuits and, although I have built one accu- keyer (see the *ARRL Handbook*), I have trouble wading through the circuitry to find out exactly how it works.

BASIC MORSE

Using the length of a dot as a base, the length of a space between elements should be one dot length. The length of a dash should be three dots, spaces between letters should be three dots, and spaces between words should be five (or more) dot lengths.

If a signal has its dots and dashes too long with respect to the spaces between them it is said to be weighted. But it is sometimes called the dot- dash ratio, where the dash is longer than three dot lengths.

The main effect of weighting is that the dots sound much shorter than unweighted Morse at the same speed.

Incidentally, the length of the dot varies from 200 milliseconds at five words per minute, down to 40 mS at 30 WPM, and only 20 mS at 60 WPM.

The main reason for using an electronic keyer is that it is *easy*. There are a few steps from the hand pump to the electronic keyboard and they probably all stem from people wanting an easier sending method. After the straight key there were numerous mechanical keys which usually involved a weighted spring to give a short series of dots, with a manual key for the dashes.

The most basic electronic key has a series of clocked pulses (dots) available by pressing the paddle to the right, the dashes would still be generated by pushing the paddle to the left for the required time. This type of keyer is readily available today and sometimes has an automatic dash where you can hold the dash paddle on and get a string of dashes. It is also usual to find a speed control at this level.

The next model electronic keyer has two paddles spaced about 10 mm apart so that the digital circuitry can be designed to give *iambic* operation. Iambic is when you press both paddles at the same time and get didahdidahdidahdidah . . . etc. If you want dahdidahdidahdidahdi, you must squeeze the dah paddle first. Depending on when you let go, you will end in either a dit or a dah. With this type of keyer you can also send a series of dits and, without removing your thumb from the dit paddle, you can insert a dash by tapping the dash paddle at the appropriate time. This is useful when sending F or L. Conversely, a dot can be inserted into a string of dashes in the same way for the letters Q and Y.

DOT-DASH MEMORY

Most keyers have this feature. It means that if you squeeze the key quickly you will get either an R or K depending on which you squeeze first. What happens is: even while the circuit is generating the first dot and dash, it remembers that both the paddles were pressed together for a small amount of time, so it inserts a dot after the dash, you were probably letting go of the paddles while the dash was being generated. With the dot- dash memory disabled you would get an A instead of the R, and the timing of the squeeze will be very critical if you want an R. This is because you have to open the paddles after the last dot starts, but before the next dash starts, we are talking milliseconds here.

If you want an A, etc, you must flick each paddle separately when the dot- dash memory is operating, but this is much easier than trying to get the timing right with the dot-dash memory disabled. Anyway, the disabling of the memory requires *more* components.

AUTOMATIC CHARACTER SPACING

The accu-keyer circuit (*ARRL Handbook*) had an auto- space feature which worked like this.

If you left a space of more than one dot length in your sending the keyer automatically held up the initiation of the next dot or dash for a time of three dot lengths, even if you only left a space of one and a half dots. So you could be really sloppy with your timing and still get the character spacing perfect every time. There is only one drawback, at higher speeds of 25 WPM, the dot space is so small (about 50 milliseconds) that if you are too slow slapping the dot-dash for the letter A, the circuitry thinks you are sending E T and puts in the space.

I think this is what brass-pounders mean when they say that keyers sometimes have a mind of their own. Not surprisingly the letter N is okay as you have more time to let the dash paddle off before tapping the dot. So if you hear someone jumbling up their As by sending E T; or his W by sending E M; or his J by sending E O; or even 1 by sending E MM; you will know exactly what is going wrong. The only way out of this dilemma is to disable the auto-character space or slow down.

Well, except for keyboards, that about covers it. I will not go into keyboards as I have never used one (for Morse) yet, but if you can type, you can send Morse with one. And if you can type fast, well . . .

But learning to send on a good keyer is probably easier than learning to touch-type, so I will leave it there.

If you want more convenience, say for contesting, you can go for an electronic memory, or even a taped message. I will refer you to the excellent article in May AR, by Ron Mills VK5XW, and Lindsay Collins VK5GZ, on their memory keyer.

If you are an avid CW operator who is just getting tired of a hand pump, or if RSI is giving you trouble, try some of the electronic keyers and see what you think.

Even if you do not particularly like CW because it is so hard, it may be worth-your-while building a cheap keyer just to see how easy it really can be, this is how I became interested in CW and that was before I took any of the amateur radio examinations. I did have a bit of a problem going back to the hand key for sending in the exams.

By the way, if you have anymore questions, do not hesitate to drop me a line and I will see if I can answer them. If I can't, I guess I will have to learn some more!

How's DX?

Ken McLachlan VK3AH
Box 39, Mooroolbark, Vic. 3138

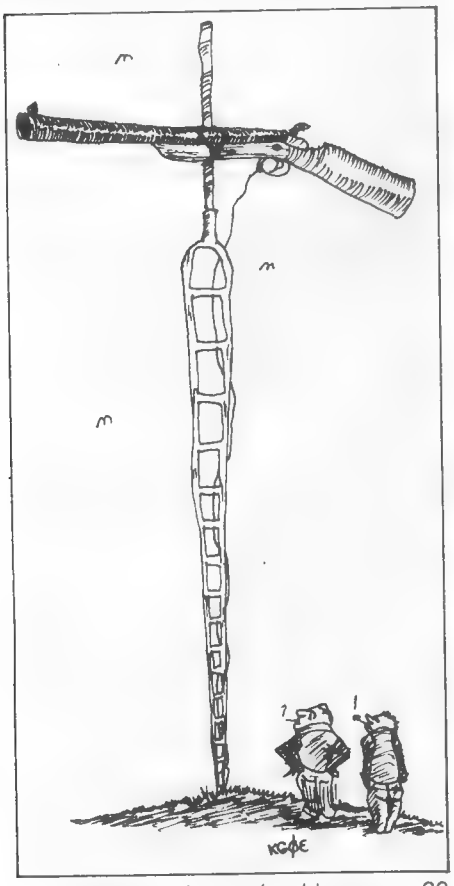
It seems to be the done thing by a number of operators not to use a log book any longer, since the necessity was abandoned by the Department of Communications.

I feel that the two main necessities of operating are a log book and using UTC time, even if one is not an ardent DXer, as it is necessary to check SWL cards and one has a record of all stations worked at their fingertips.

SWL cards are very valuable to the listener and in some countries they are obliged to show evidence by way of submitting a log and a high number of received cards from amateurs, before they are allowed to sit for the amateur examination.

If one does not keep a log, they have no way of verifying that they were on the air at that time, as some cards come in up to three or four years later and no one's memory is that good.

So for good operating practice, please keep a log book, so that the standard of QSLing will be upheld and that your card is an authentic record to the recipient.



No wonder you're such a big gun on 20 metres!

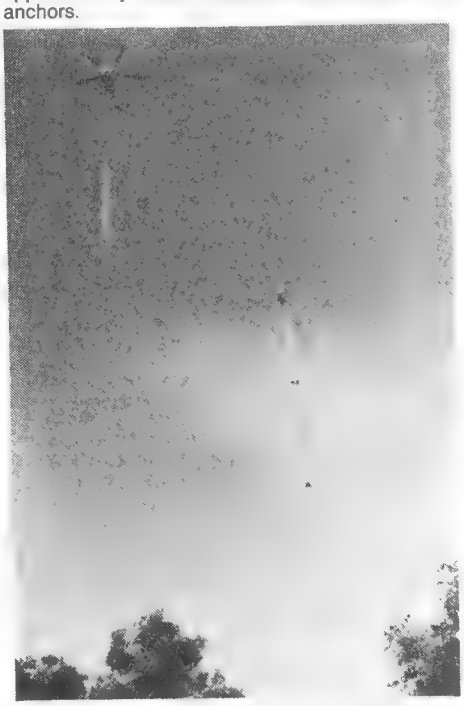
ANTENNA ERECTION

Jan and Jay O'Brien, K6HHD and W6GO, who publish the excellent QSL directory, *W6GO/K6HHD QSL Manager List*, are back on the air after moving QTH. By all accounts, complimented by a lot of finger biting, they should have a fine signal which they can point to any part of the world.

Much thought, preparation and planning went into the erection of a 48 metre tower and three monoband antennas. A KLM dipole for 75 and 80 metres which is 27.5 metres long is at 47 metres, whilst at the 45 metre mark is a KLM four element, 40 metre beam with a boom length of 13 metres and six elements situated at 43 metres and weighing in at 57 kg, resonates on 20 metres. This unit has a 17.5 metre boom.

The first lift by the helicopter.

The whole tower and antennas were erected in about three and a half hours, with, wait for it, the aid of a very skillful pilot in a helicopter. The first part of the exercise was to erect the bottom half of the Rohn 55 tower which measures 21.5 metres on to the base and position the two sets of guys and tension them. Incidentally, the base is resting on one cubic metre of concrete and there are approximately three cubic metres holding the guy anchors.



Another section of the tower being placed in position by the helicopter.

Photographs courtesy Jan O'Brien K6HHD

Bolting the last section into place.

Next part of the exercise was to place the second part of nine metres, which comprises a rotating base at the bottom and guy ring at the top, in place. The rotator was modified to rotate twice to the towers one revolution.

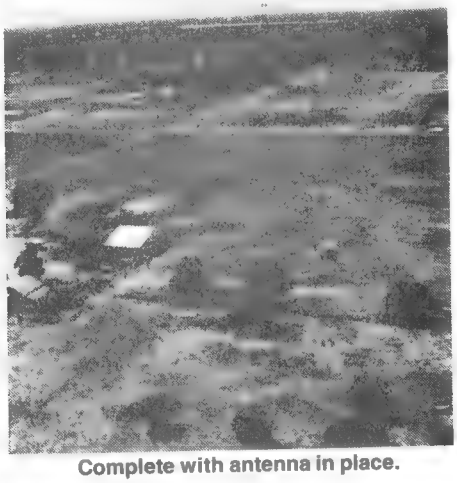
Next step was to place another nine metres, complete with a guy ring, on top and bolt it into place. Everything went like a dream until 'Mr Murphy' took over.

Jay, with all the coaxial cable connected to the transceivers, turned on and couldn't hear a thing. Exasperation, until he quickly discovered the remote coaxial switching device was not correctly connected half way up the tower and a quick climb rectified the problem. (You're braver than I am Jay!).

The huge arrays are 116 metres from the rotator to the operating position in the shack and the longest length of coaxial cable to any antenna does not exceed 152 metres. Another beam is yet to be placed in position, that is a six element triband beam and it will take pride of place at the 31 metre mark.

Jan remarks "How is that for an eventful Saturday?" I would say not bad Jan. They also remark even though it is in the centre of a four hectare paddock, several cars were parked on the adjacent road and even a neighbour came over to see what was happening. The neighbour turned out to be a professional photographer and would never miss out on a good picture!

To this happy duo, who give so much to the hobby, very happy DXing and don't forget to turn the beams down towards VK and make some more friends, as I am sure you will be heard and welcomed.



Complete with antenna in place.

UNWELL SWL

Recently, Eric L30042, suffered an injury which necessitates a lengthy stay in hospital.

Eric, best wishes for a speedy recovery from all DXers and readers of this column. A speedy recovery is essential so you may resume listening on the bands.

CARDS

Jim G3OKQ, who had numerous QSOs from Pitcairn as VR6JR, should be starting to answer his stack of cards by now, so please be patient and do not repeat requests.

CARDS BY THE KILOGRAM

A note from Neil VK6NE, the WIA Federal QSL Manager, states that he received a parcel of cards from the USSR. The weight was 1.875 kg and 1.050 Kg were from SWLs, with over 50 percent of the SWL cards reporting hearing a USSR station in contact with a VK0 or VK9 amateur. The QTH on the received cards to different operators were predominantly from the same city or Oblast.

If one gram is assumed for each card, then one would be reasonably correct in accessing the number, which is a lot of cards in anyone's language. There were 0.825 kg of cards for the operators.

Incidentally, Neil is still eagerly awaiting the postman to deliver his S9 card.

SELVAGENS ISLAND

If you worked the call CR9SI in August, last year, and are still awaiting a card, worry no more, as you are not going to receive one.

It is believed that the QSL Manager, CT3BD, has openly said that he has no intention of answering the cards. I hope this is not true as I feel that it is an irresponsible action that should be reported to his Society. Also, what is going to happen to the money and IRCs that have been sent. One can guess, as unfortunately it has happened before and sad though it may be, I predict it will happen again, probably many times. Unfortunately, it is not in the best interests of the hobby.

BELATED WISHES

Belated birthday wishes to Father Moran 9N1MM, who celebrated his 80th birthday on May 30.

Father Moran, has given many a new country in the long time he has been active from Nepal, whilst he has been a teacher at the Godavari School, near Kathmandu. He is very active and a keen supporter and controller of the South-East Asia Net (SEANET) on 14.320 MHz at 1200 UTC each day of the year.

Congratulations Moran from all DXers and may many happy years of operating lie ahead of you.

NO QSL BUREAU

The following countries do not have QSL facilities, therefore cards must be forwarded direct or to a manager if known — please do not send to your bureau.

3C	Equatorial Guinea.
3V	Tunisia.
3W/V	Vietnam
3X	Guinea.
4W	North Yemen.
5A	Libya.
5H	Tanzania.
5R	Malagasy.
5U	Niger.
5X	Uganda.
7Q	Peoples Democratic Republic of Yemen.
8Q	Maldive Islands.
9G	Ghana.
9N	Nepal.
9U	Burundi.
A5	Bhutan.
A6X	United Arab Emirates.
A7X	Qatar.
BV	Taiwan.
C9	Mozambique.
D6	Comoros.
ET	Ethiopia.
HZ	Saudi Arabia.
J5	Guinea-Bissau.
KC4	US Antarctica.
KC6	Belau and Micronesia.
KH1	Baker and Howland Islands.
KH3	Johnston Island.
KH5	Palmyra and Jarvis Islands.
KH7	Kure Island.
KH9	Wake Island.
KP1	Navassa Island.
KP5	Desecheo Island.
P5	North Korea.
T2	Tuvalu.
T3	Kiribati.
T5	Somali.
TJ	Cameroon.
TL	Central African Republic.
TN	Congo.
TT	Chad.
TY	Benin.
TZ	Mali.
V4	St Kitts/Nevis Islands.
VK0	Macquarie and Antarctica.
VP2E	Anguilla.
VR6	Pitcairn Island.
XT	Burkino-Faso.
XU	Kampuchea.
XW	Laos.
XX9	Macao.
XZ	Burma.
YA	Afghanistan.
ZA	Albania.
ZD7	St Helena Island.
ZD9	Tristan da Cunha.
ZK2	Niue Island.
ZK3	Tokelau Island.
ZS2	Marion Island.

SURPRISE!

Don't be surprised if 1987, or before, sees individual stations being licenced in the Peoples Republic of China. A recent meeting by the authorities was due to consider such a move.

UNUSUAL CARDS

GB6OC, operational from the City of Birmingham in a bid to hold the 1992 Olympic Games from that city, is having six operating stints this year. Each operating stint will have a district QSL card. The June 14/15 operation depicted Horse Jumping, the theme for the July 18/19 schedule featured Athletics. These cards are well worth having in ones collection, so keep listening. Bureau QSLing is in order, considering the price of postage which has escalated dramatically.

CHANGE OF HEART

Mike A71AD, as mentioned previously in this column, had to leave his logs behind for inspection by the Qatar Telecommunication Authorities, when he left the country.

The authorities have now allowed Mike to retrieve those valuable logs and the calls of A71AD, A7XD and his new call, 5B4TI, can be QSLed by sending direct to Mike Smedal, PO Box 7121, Nicosia, Cyprus.

PAPER WARFARE

A note from Steve VK2PS, says that he has been fighting the bumbledom red tape paper war and has had little time for using the rig, but managed a couple of QSOs which were quite interesting. One was a chat with HA4KYN, who was using a 20 element log periodic antenna which, believe it or not, is portable even to the angle being adjustable. This station was booming in with a 5x9 plus signal. Others that Steve had a few words with were EA8ACH on 20 and a nice contact with Lynn WH8AAP, on CW.

Steve received a nice selection of cards during the month, including 5E1EJ, EA8ANR, JT1BH, VO1CA, VR6TC, VS6AD, XO3IY, XX9DX, YE3C and ZK2KH.

The YE3C card was to commemorate the 40th Anniversary of the Indonesian Army Signal Corps.

Another keen DXer, Jim VK3YJ, has been tied up with other commitments but has managed to work 3C0A, 5H2ZR, 9H1EL, 9J2BO, 9V1TL, 9Q5CT, A22DP, AP2SQ, C21RK, HL7AP, HS0A, OH0AM, PA0QRS, T2ITA, UI8GM, VE2PAB/YK, VK0SJ, VU2TN, VQ9DL, VQ9ZZ, WB6JEB/KH7, ZL7AA and ZS2SB on 20 metres SSB.

ANNOBON

Annobon, now known as Pagalu, is a fragmented part of Equatorial Guinea which suffers a fragile economy, regional differences and the incubus of a heavy psychological legacy from the colonial era. The colonial era ended when it gained its independence on October 12, 1968.

This rugged volcanic island, with a rainfall approaching 3000 millimetres per year, is located in the Gulf of Guinea with the co-ordinates of one degree 25 minutes south and five degrees 36 minutes east, and occupies an area of 17 square kilometres, comprised by a conglomeration of cones. Monte de Santa Mina is the highest and it rises to an altitude of 670 metres.

It is 150 kilometres south-west of the Principe of Sao Tome and about 650 kilometres south-west of Macias Nguema Biyogo from where it is administered.

Pagalu, is approximately seven kilometres long by four kilometres wide. The population of just over 1400, mainly live in San Antonio where the fishing and minor lumbering activities are located. The language spoken is a Portuguese patois.

THE PREFIX FK25

Another prefix, this time from New Caledonia. The prefix FK25 is being used to celebrate the 25th anniversary of the Amateur Radio Association of New Caledonia from the ninth of last month until the end of the year.

A very attractive commemorative award will be issued to anyone making one contact with the Club Station FK25A, or three contacts with different FK25 stations, or five contacts during the above period with stations using the prefix FK8, FK1 or FK0.

Cost of the award is five IRCs or US$2, with a certified log being sent to PO Box 3956, Noumea, New Caledonia, South Pacific.

4UIVIC

This club is seeking legal advice on their DXCC problem. But putting this aside, they have a beacon on 23 cm, holding licence classes for would-be amateurs and are getting organised with Packet Radio.

The Clubs Office Bearers are well known DXers. Dick K7AWD/OE1ZOS, is President, John NK4N/OE3ZOC, Vice-President and Station Engineer. Jerry OE3JBU, has the onerous task of being the Secretary/Treasurer.

DON'T MISS

The station signing 6K86AG, is commemorating the Asian Games being held in South Korea. It is believed a very special card has been created for the operation.

NEW CLUB

The Falkland Islands Amateur Radio Club was formed on June 3, this year. It was inaugurated at the Mount Pleasant Airport in a bid to bring together active VP8 operators and act as a QSL Bureau. The Secretary is Barry VP8WTW and the address is PO Box 260, Mount Pleasant Airport, Falkland Islands.

THE LOW BAND

Ron VK3BEE, has been around this band as time permits. He has heard UA9UCO, in the morning hours on June 25, at 2150 UTC and UA4KBH, three days later at 2200 UTC. Both were on CW. In the evenings VE7BS was heard on SSB at 1130 UTC on July 24, with VE1ZZ, being noted at 0730 UTC, working CW on July 12.

Ron has been active in the evenings on SSB and worked KL7Y at 0920 UTC on May 1. AA1K at 0930 UTC and VK0SJ (Macquarie Island) at 1030 UTC were in the log for June 24. Next day, at 0910 UTC, FO0ASJ was snared and two days later the same station was worked on CW, at 0915 UTC.

Ron, has also worked ZLs 2APM, BFG, BFU, 4IG and VKs 2, 3, 4, 5, 6 and 7.

Other interesting information on this band is that, as from July 1, the following club stations received permission to operate. They are HG1S, 1Z, 5A, 6N, 6V, 7B, 8U and 9R.

BITS AND PIECES

Doubtful operations are from stations signing with the prefix **SU0** and the station **7O2FF**, which has been heard on 20 metres. Other doubtfuls to beware of are **4W1NN, KH8KY, P23UKK, ZA1C** and **ZA9RZE**. * * **SX1MBA**, was used from the radio room of the battleship *George Averoff* to commemorate Greek Navy Week. * * **YM3KA**, an unusual call, was aired from Izmir. * * Special QSL cards are available for working **ZY2KMT,**

LQB, MKL, MOK, MXK, a call used to commemorate the 51st Anniversary of Aquas da Prata City, a major Brazilian tourist resort. * * **Jean Paul 5R8JD**, was quite active up until he went QRT in the middle of last month. * * **Allen ZL7BKM**, is around a lot on the bands and QSLs go to **ZL2HE**. * * **Tom AH9AC**, can be heard frequently on 20 metres. * * **I3BQC/SDI** were operational from San Francesco del Deserto Island which is located in the middle of a lagoon. (What next . . . VK3AH). * * **3A0A**, Pagula Island, worked many Europeans and a few VKs. * * DV licence holders are allowed above 14.275 MHz, DW 40 metre CW only. * * **Manola 3C1MB**, should be using a beam by now. * * The first amateur radio festival in Turkey was marked by the use of the calls **TA3KA** and **YM3KA**. * * **'Bull' 9U5JB** is now QRT, QSL to **ON5NT** (No Trouble). * * Some HA operators now have permits for 160 metres. * * **Albert FO8JR**, anticipated being operational from Tubuai Island, located about 650 kilometres south of Tahiti from August 12, for one month. It counts as French Polynesia and QSLs go to PO Box 10127, Paea, Tahiti, French Polynesia. * * **Rick HC1MD/HC8**, was combining a family trip with some DXing from Puerto Ayora in the Galapagos Islands last month. QSL to PO Box 62, Rochester, Michigan 48063, USA. * * **A61AA** may be active again with **John W4FRU**, being the Manager. * * Present Vietnamese law prohibits the entry of any type of transmitting equipment into the country. Hence no XV operation. * * Members of the Japan UNICEF Club, operated **HS0C** at the end of July. QSL to **JA8ATG**. * * Well-known QSL Manager, **John W4FRU**, has been appointed the Chairman of the ARRL DX Advisory Committee. Congratulations or should it be commiserations, John * * It is anticipated that **3C0A** cards will take a long time to be processed, due to a photograph being selected, printing and finding out who will have the onerous task of filling them out. So have patience and do not double up on the cards, please. * * **GB2WED** and **GB6RW** were special call signs used for the Royal Wedding, for one day, July 23. QSLs for **GB2WED** to **G4IVJ** and **GB6RW** to **G4KIU**, either direct or via the bureaus. * * **GB6NP**, was used to celebrate 25 years of nuclear power. QSL to PO Box 73, Ipswich, England. * * **Dennis W6UBC/OX3**, hopes to be set up for DXing shortly and to also obtain his own call sign. * * **KH6JEB/KH7**, was quite active from Kure Island. Now QRT, but **KH6LW** was due to be active last month, mainly on CW. * * The **ZY** prefix, was in commemoration of the 51st Anniversary of the city of Aquas da Prata in Brazil's San Paulo state. Commemorative QSL cards will be issued. * * **PA6VHS**, will be operational on CW until October 30, to commemorate the 25th Anniversary of the Very High Speed QSL Club. QSLs to **PA0DIN**. * * **TA2L**, is a new station who operates SSB only. * * The NIAR in India advertised that they had QSL cards available for members. Orders received in the first week of announcement in their newsletter, exceeded 5000. * * The **Burmese Government** have advised the IARU again, that amateur radio has not been legal since January 10, 1964. There was no indication if their would be a change in their policy. * * The special call **A4XOS**, was used from the special camp of the 17th Arabic Scouts, at Salalah in the latter part of August. QSL via the Royal Omani Amateur Radio Society. * * **GB8CG**, was the special call for the Commonwealth Games. * * **T32AU**, was **Alan T30AT**. QSL to **G4GED**. * * Fluent in the French language? Then look for **Bernard FY4EE**, who also operates 30 metres.

THANKS

Sincere thanks are extended to the following: The Editors of weekly, biweekly and monthly newsletters including the ARRL NEWSLETTER, BARG, CQ-QSO, DX FAMILY FOUNDATION NEWSLETTER, INSIDE DX, THE W6GO/K6HHD QSL MANAGER LIST, KH6BZF REPORTS, NATIONAL INSTITUTE OF AMATEUR RADIO HYDERABAD, PAPAKURA RADIO CLUB BULLETIN, QRZ DX, RSGB DX NEWS and THE WESTLAKES AMATEUR RADIO CLUB NEWSLETTER. Magazines including, BREAK IN, cqDX, DX POST, JA CQ, JARL NEWS, KARL NEWS, QST, RADCOM, VERON and WORLDRADIO.

Members who have contributed include VKs 2PS, 3BEE, YJ, YL and 6NE. Overseas amateurs include K6HHD, W6GO, ZLs 1AMM and AMN. Sincere thanks to one and all who have made this months column possible.

BEACONS

Tim Mills VK2ZTM
FTAC BEACON CO-ORDINATOR
PO Box 204, Willoughby, NSW. 2068

The HF Beacon concept was described in the last report. This month we will look at VHF/UHF Beacons.

In Australia, six metres to 23 cm has been band planned with 200 kHz being set aside for beacons. Each State or Territory has four allocations, with the second last figure in the frequency indicating the State — eg the two metre VK2RSY Dural Beacon is on 144.420 MHz. The prime allocation occupies the .4 to .5 region of the band with allocations every 5 kHz — eg VK2 also has 144.425 MHz. There is a secondary allocation for each State's other two channels, and except on six metres, this is between .5 and .6. On six metres it is .3 to .4 to avoid the FM allocation of 52.525 MHz.

A variation to the above is practiced with a couple of VK6 systems. The harmonic relationship of 2-70-23 allows a single crystal to produce an RF source and then to tap off some power at each band via an amplifier or straight to the antenna.

A few of the older beacons, for various reasons, have stayed on their original frequencies. Pre-band planned beacons appeared almost on any frequency, often with the first crystal which came to light from the junk box.

The role of a beacon has been mentioned previously, and as I view it includes:

- a local signal source of known characteristics for receiver, antenna adjustment and reference
- a signal source over a (distant) path which can be observed by manual or automatic means. (Project Assert did this in the late 1970s)
- they provide signal sources to see if there is a band opening or a path between your location and the beacon.

I think that there is little to add to the operation of beacons at VHF or UHF frequencies. However, it is at microwaves that beacon guidelines need to be formulated and I ask all interested parties to contribute.

First, these frequencies are perhaps the last for amateur experimentation. They already have heavily commercial use, and in most portions we are the secondary service. There are only a few amateurs in ratio to other bands and much of the operation is likely to be either home-brew on converted/adapted equipment. (You don't go down to the local store and buy your equipment!).

Why would anyone want to put a beacon on a microwave frequency? I would think for the same roles as outlined above. Certainly it provides a local — constant — signal source, and signals lead to activity. Perhaps the most important thing is the beacon frequency/s with relationship to band use. It needs to be within the reception range of equipment in use but not to interfere with normal working. With widely separated centres of amateur population, it could be possible to have a common beacon frequency on each band which could then be registered as an assignment for that purpose. Power levels are going to be low and antennas need to be designed to provide the best coverage for the users in the region.

VK2 is currently developing beacons for VK2RSY Dural on 10 and 24 GHz. The frequencies being used to start the construction are 10.300 GHz and 24.100 GHz. They may be modified later to suit the Band Plans being developed.

Can you contribute to the *Beacon Paper* currently being prepared? Your input would be most welcome and should be sent to FTAC, PO Box 300, Caulfield South, Vic. 3162.

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AMATEURS SATELLITE "GATEWAY" OPERATION

▽ Amateur radio operators in West Virginia and California, USA, made a communication breakthrough on May 28, 1984 that may have far-reaching future uses both amateur and commercial. A short-range two-metre repeater was linked into a far-range transponder on an amateur satellite that enabled two very low-power transceivers to make contact across the United States.

Jay Paulovicks KD8GL, in Wheeling West, Virginia on a 300 mA hand-held contacted Karen Henderson KB6DQQ, in Los Angeles. Karen was using a one watt hand-held. This was one of a series of tests conducted by the *Triple State Radio Amateur Club* using a system called "gateway" by the Amateur Radio Satellite Corporation (AMSAT). The satellite "gateway" stations were WB7ZTV, operated by Don Knollinger in Moundsville WV, and N6JFD operated by John Henderson, California.

To show further applications of this capability, one amateur in the Wheeling area using a low-power hand-held, had several contacts with stations at Lake Havasu, Arizona. To demonstrate the new long-range capabilities, 19 stations made contact with ZL1AOX in New Zealand and several with G8MSZ in the United Kingdom, during the series of tests.

The repeater station operating with the satellite changed the two-metre FM signal received from the hand-held unit to SSB on the 436 MHz up-link to the satellite, and from 147 MHz on the satellite downlink to FM on the two-metre repeater transmitter back to the hand-held unit. Originally the setup used phone-patch hookups between the repeater and the satellite station but this was later eliminated by the use of Gunnplexers between the repeater site and the satellite station.

According to an AMSAT official, WA2LQQ, "this historic event marks the vanguard of easy-access satellite communications for utility use by minimally equipped amateurs. Nothing can beat the flexibility of your own OSCAR station, but for those just starting out, this seems a good way to taste the wine before one buys the bottle."

An editorial in *Westlink* commenting on this application break- through test stated: "It signals the end of the stereo-type of a repeater as being limited to a given locality. Now, that same repeater when tied to an OSCAR-10 earth station . . . has the ability to provide its users with much greater coverage than had been thought possible. It means that high frequency traffic nets, that currently fight the effects of propagation abnormalities and intentional and unintentional QRM, can begin to think about the possibilities that lie in linking themselves via satellite. It also means that in time of emergency, the extreme reliability of satellite communications can be depended upon for the saving of lives. The possibilities are endless."

A free information kit is available (by sending IRCs) from: AMSAT, PO Box 27, Department GW, Washington, DC 20044 USA.

Written by Ralph McDonnough K8AN and reprinted from *Telecommunication Journal*, Vol 53, V/1986

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DIGITAL FINGERPRINTS

The Australian Federal Police and state police departments are to have on-line connection to the NSW Police's computerised fingerprint data-base.

They will eventually use NEC equipment to digitally record fingerprint images. The NEC automated fingerprint identification system is a world first and speeds up the checking of prints left at crime scenes which has traditionally been done manually.

The data-base contains 2.6 million individual prints and has the capacity to handle six times that amount.

Awards

Ken Hall VK5AKH
FEDERAL AWARDS MANAGER
St George's Rectory, Alberton. SA. 5014

AWARDS ISSUED RECENTLY

WAVKCA Award

1485 David Brighton G4ISK
1486 Yoshihiko Hirano JA2MNB
1487 Akiyoshi Takahashi JA7AER
1488 Carlos W Diez M. TI2KD

VICTORY 40 AWARD

I was pleased to receive these in bulk from Moscow, and they have been distributed as follows:

225 Alan Roocroft VK5ZN
359 J A E Woodings VK6AJW
377 H Rusjven VK4BHR
581 Joe Ackerman VK4AIX
587 Gwen Tilson VK3DYL
700 H Rusjven VK4BHR
1066 Ken D Hall VK5AKH
1141 VK2CFN
1183 D Couch VK6WT
1237 Henry G A Andersson VK8HA
1451 C J Willard VI3CJW
1601 J T Kelleher VK3DP

YL INTERNATIONAL SSBers, INC

Thanks to Gray Taylor VK4OH, who sent me a newsletter from which the following information has been extracted.

Firstly, I notice that membership is not restricted to YLs, and secondly, that CW contacts qualify for awards as well as SSB.

There is a comprehensive program of about 50 awards, most of which are available to non-members, and most of these are granted for contacts with members, and some of which are available to SWLs.

For example, the basic *King Neptune Award* may be obtained for contacting 10 USA members and five DX members, and is available to SWLs also; whereas the *North Star Award* is issued in five classes:

Class A for working a member in 150 countries
Class B for working a member in 100 countries
Class C for working a member in 50 countries
Class D for working a member in 25 countries
Class E for working a member in 6 continents
This Award is not available to SWLs.

Membership is world-wide, from AD1S to 9Y4VV, with more than 14 000 members listed. Space forbids reproduction of all the details here, but if anyone would like further information, please send me the cost of copying and posting six pages (for awards list and rules), plus 60 pages of members listing, or write direct to 428 SW 28th Road, Miami, Florida, 33129, USA.

MARION'S CENTENARY CELEBRATIONS AWARD

As 1986 is the Centenary of the Marion Council, which was proclaimed on September 2, 1936, a special event station using the Jubilee 150 call sign, VI5JSA, will operate from the City of Marion Library from August 26 to September 5, 1986.

A Marion Centenary Award will be issued to stations working (or SWLs on a heard basis) VI5JSA. Endorsements for CW, SSB, RTTY and VHF will be available. Applications may be a log extract or a QSL card with $2 (or four IRCs) direct to the Award Manager, VK5SJ (QTHR) or endorsed "Marion Centenary Award" c/- Box 1234, GPO, Adelaide, SA. 5001.

WOMBAT AWARD

This Award is issued by the Shepparton and District Amateur Radio Club, and is available to all amateurs and shortwave listeners who obtain the required number of points.

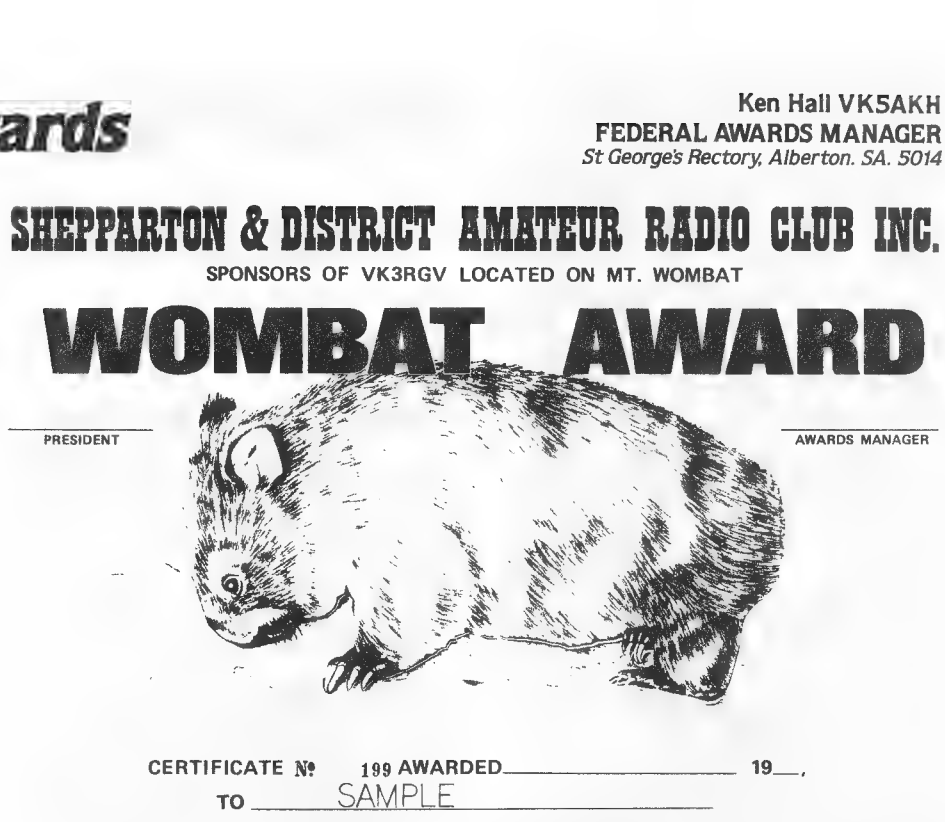
To qualify for the Award, applicants must log the Club Station, VK3DBS, and club members to a total of 15 points. Points will be awarded as follows:

Club Station, VK3DBS — three points
HF and VHF Simplex Contacts — two points
Mount Wombat Repeater Contacts — one point

The Club Station may be logged only once, however, repeat contacts with club members is allowed after 24 hours has elapsed.

Contacts may be logged during the Club Net every Tuesday evening at 0930 UTC, on 3.610 MHz, ±QRM, or at 1000 UTC on VK3RGV, 146.650 MHz.

The attractive Award Certificate is 21 x 29 cm and has a brown design and lettering on a yellow background. Cost of the Award is $3 and applications should be sent to the Awards Manager, SADARC, PO Box 692, Shepparton, Vic. 3630. A list of club members is available from the same address, please send a SASE.



SHEPPARTON & DISTRICT AMATEUR RADIO CLUB INC.
SPONSORS OF VK3RGV LOCATED ON MT. WOMBAT
WOMBAT AWARD
PRESIDENT
AWARDS MANAGER
CERTIFICATE № 199 AWARDED _____ 19__,
TO SAMPLE
FOR CONTACTS WITH MEMBERS OF SADARC IN ACCORDANCE WITH THE RULES.

PADDLE STEAMER *INDUSTRY* JUBILEE 150 AWARD

From September 19-22, 1986, VK5JSA will be operating from on- board the paddle steamer *Industry* at Renmark, in the Riverland of South Australia. This event is to enable amateur radio operators to gain further points for the Jubilee 150 Award.

During these four days, VK5JSA will be working all bands, 7.086, 14.186, 14.286, 21.186 and 3.586 MHz. One contact with VK5JSA on any band will be worth 15 points for the Jubilee 150 Award.

In addition, there will be available to all amateurs who contact VK5JSA on the paddle steamer *Industry* an award called the *Paddle Steamer Industry Jubilee 150 Award.*

A QSL card confirming the contact date, time, signal report, etc, plus $2 for packaging and postage should be sent to the Awards Manager, Douglas Tamblyn VK5PDT, PO Box 646, Renmark, SA. 5341.

Contributed by Douglas Tamblyn VK5PDT

BFRA AWARDS PROGRAM

The Bulgarian Federation of Radio Amateurs has an interesting awards program with six certificates, available to amateurs world-wide, for two-way contacts or SWL reports on CW, SSB, AM or mixed-modes. Applications of the GCR list of claimed QSOs are to be verified by two licenced radio amateurs or the local club authority and must specify stations worked, date, time in UTC, band, and mode together with a fee of 10 IRCs. The address for all awards is PO Box 830, Sofia 1000, Bulgaria.

People's Republic of Bulgaria

Valid QSO/SWL reports after January 1, 1965. Applicants require 20 QSO points with different Bulgarian amateur stations, 10 with LZ1 and 10 with LZ2, irrespective of the band.

Five-Band LZ Award

Valid QSO/SWL reports after January 1, 1979. Applicants require 10 QSOs with LZ1 and one with LZ2 on all bands — 3.5, 7, 14, 21, and 28 metres

W 100 LZ Award

Valid QSP/SWL reports after January 1, 1979. Applicants require 100 QSOs with different LZ stations during one calendar year.

W 28 Z ITU Award

QSO/SWL reports after January 1, 1979 are valid for this award and applicants require QSO/SWL reports with the following countries of 28 ITU zone:

DL, DL7 West Berlin, FC/TK, HA, HB9, HB0, HV, I, IS, LZ, M1, OE, OK, SP, SV, SV5, SV9, YO, YU, Y2, ZA, 9H, 4U1ITU.

This award is issued in three classes —

Class 1 — 28 QSOs with different stations in 20 countries.
Class 2 — 28 QSOs with different stations in 16 countries.
Class 3 — 28 QSOs with different stations in 10 countries.

In addition, five QSOs with different LZ stations are required.

Black Sea Award

Valid QSO/SWL reports after January 1, 1979. Applicant require 60 QSO/SWL reports with different amateur radio stations located in the countries bordering the Black Sea. A minimum of one QSO/SWL report with each of the following countries LZ, TA, YO, UA6, UB5, is an additional requirement.

Sofia Award

Valid QSO/SWL reports after January 1, 1979. Applicants require 100 points from QSO/SWL reports with amateur stations situated in the capital of Bulgaria — Sofia. The calculation of the points has to be made in accordance with the following table.

3.5 — 15 points, 7 — 5 points, 14 — 1 point, 21 — 2 points and 28 MHz — 3 points.

A QSO/SWL report with the same station may only occur once per band irrespective of mode.

The most active stations in Sofia are:

LZ1s — KAA, KAB, KDP, KPG, KSA, KSF, KVV, KWF, AB, AD, AM, AP, AQ, AU, BC, FF, FN, IA, JW, KX, LB, MS, NP, QG, QI, QP, SS, UA, UO, WV, WD, WJ, XL, XX, ZQ.

LZ60 Jubilee Award
This Award is a special award issued by the Bulgarian Federation of Radio Amateurs to celebrate the 60th Anniversary of the foundation of the first amateur radio club in Bulgaria, in 1926.

The Award is issued to radio amateurs worldwide. It is available to those who have contacted (or heard) Bulgarian amateur radio stations during the period July 1 to December 31, 1986, and have scored 60 points.

A contact with a LZ6 station counts as six points.

A contact with a LZ1 or LZ2 station counts as one point.

Each LZ station may be worked only once.

The Award is issued free of charge.

An application, accompanied by an extract of the stations log, certified by an Awards Manager, or two licenced amateurs, must be sent to Bulgaria, 1000 Sofia, PO Box 830, BFRA, before July 1, 1988.

Contributed by Z Buchkova LZ1ZQ, BFRA Secretary

RALLY AUSTRALIA AWARD

This award is presented by the Redcliffe Radio Club. Its objective is to travel around Australia by radio, making progressive contacts as you go.

The award will be available in two grades — a Basic Award and an Enhanced Award, with mode and/or band endorsements available.

Basic Award — requires contacts with 25 cities and towns throughout Australia, with mandatory check-points where contacts *must* be made.

Valid contacts are those made from October 1, 1986. There is no time limit on the completion of the Rally — you may do it in one week or one year, or longer.

The *first* and also the *final* contacts must be made with a member of the Redcliffe Radio Club. Should the Redcliffe Radio Club member not be a resident of the City of Redcliffe, the contact will still be valid, provided this member made the contact from his usual QTH.

Mandatory Check-points — Redcliffe; Brisbane; Sydney; Canberra; Melbourne; Hobart; Adelaide; Perth; Darwin; Mount Isa; Townsville; Redcliffe.

A further two contacts in VK2, VK3, VK4, VK5, and VK6 and one in each of VK1, VK7 and VK8 must be made in progressive order, in location, date and time with mandatory check-points.

The Rally can be run in the order as outlined above (clockwise) but you may also elect to run in the reverse direction (anti-clockwise).

The Enhanced Award — The Enhanced Award requires the following:
Contacts with all Mandatory Check-points.
Points totalling 1000 from progressive contacts (in location, date and time) throughout Australia (see below).

Extra time points will be awarded for completion of the Rally within three months.

The point scoring is for contacts within:
VK1 . . . 20 points; VK2 . . . 10 points; VK3 . . .10 points; VK4 . . . 10 points; VK5 . . . 20 points; VK6 . . . 20 points; VK7 . . . 20 points; VK8 . . . 20 points.

Time bonus points apply if the rally is completed in seven days . . . 150 points; 14 days . . . 120 points; 21 days . . . 100 points.

For every further seven days or part thereof, deduct 10 points. This means that, should you not be able to finish the Rally within three months, the basic 1000 points are required.

While contacts anywhere in Australia may be made, an attempt to return to the coast-line as near as possible to the last coastal contact is mandatory.

To encourage more inland contacts, should the return to the coast be at the location where the coast was left and the second contact is not with the same station or if the same coastal station is worked after 48 hours have elapsed, the inland contact is worth an extra 50 points.
(NOTE: If, for instance, you work/hear a station in Rockhampton and then a station inland at Longreach, there are three ways to return to the original Rally.

1. One tries to work/hear another station in Rockhampton
2. One tries to work/hear the same station in Rockhampton, but only after 48 hours has elapsed
3. If it is impossible to hear/contact Rockhampton, then one can try to make contact with a Gladstone or Bundaberg station (clockwise-trip) or Mackay (anti-clockwise trip). However, in this case, the Longreach station will only be worth 10 points as against the extra 50 points under 1 and 2.

It is therefore essential to have a map of Australia ready at all times in the shack.

Applications for this Award must be accompanied by a Certified Log extract, showing date, time, call, band, mode and location of the stations worked. Certification to be signed by two other radio amateurs. (QSL cards are not required for application).

Cost of the Basic Award is $A4 or 12 IRCs. The Basic Award consists of a well-designed two-colour Certificate and will be sent via air mail.

Cost of the Enhanced Award is $A18 or 54 IRCs and will also be sent via air mail. The Enhanced Award is a specially designed 190 x 280 mm plaque.

Listeners can also participate and must follow the same rules on a heard basis, as stated above. Their application log extracts must also include the call sign of the station worked by the logged Australian station.

Applications should be sent to: The Awards Manager, Redcliffe Radio Club, PO Box 20, Woody Point, Qld. 4019.

The Redcliffe Radio Club conducts Award Nets on:
Wednesday, 0930 UTC, 3.612 MHz; Saturday, 0430 UTC, 21.190 MHz; Saturday, 0530 UTC, 14.150 MHz; Sunday, 0930 UTC, 3.612 MHz. (All frequencies are ±5 kHz).

Any queries about this Award will be answered on the nets (VK4RC or VK4VRC). In the process you could qualify for another award, the Redcliffe City Award!

The *Maidenhead Locator* for Redcliffe is QG 62 MU and is about 30 km north of Brisbane, the capital city of Queensland.

AWARDS PROGRAM OF THE HUNGARIAN RADIO AMATEUR SOCIETY

General Rules as at January 1, 1986

1. Hungarian Awards can be obtained by licenced radio amateurs and SWLs world-wide. The specific rules of awards are given below.
2. All amateur bands and modes may be used, except contacts via repeaters.
3. Contacts/reception may be made from any location within the same DXCC country. Each station may be contacted only once on any band and any mode.
4. The log should show the call sign/s, name and QTH of the applicant, as well as the following information:

Station Worked/Heard; Date; Time in UTC; Band; Mode; Received Report (SWLs should indicate the station being worked by the heard station).

5. Each list must be accompanied by a statement from the applicants national society or from any two amateurs, other than the applicant, that the QSL cards of the contacts/receptions listed are in the possession of the applicant and that the items of the cards are correctly listed. (The exceptions are the Szeged Festival and DUNAFERR Awards when only a log extract is required, plus the confirming piece from QSL cards).

Foreign participants in the HA-DX Contest may apply for the following Hungarian Awards upon the contest QSOs using a separate application form: Budapest, Balaton, Dunakanyar, Pannonia, Savaria and WHD.

6. The fee for Hungarian Awards is as follows:

Pannonia, Savaria, Balaton and Budapest — all 10 IRCs each; Hungarian Rummy Diploma/HRD, Hungarian Canasta Diploma/HCD, Szeged Festival and Worked Hungarian Districts/WHD — all five IRCs each; Videotron Bronze — two IRCs, Videotron Silver — three IRCs and Videotron Gold — five IRCs; Hungarian Castle Series/HCS — Bronze, five IRCs, Silver, eight IRCs and Gold 10 IRCs; Dunakanyar/DD — six IRCs; Dunaferr no fee but postage should be sent.

7. The decision of the MRASZ Award Committee is final.
8. All correspondence may be sent to the Manager, or to the Hungarian Radio Amateur Society Award Committee, PO Box 22, Tiszakecske, Hungary. H- 6061.

Pannonia Award
The Radio Amateur Society of Gyor-Sopron County issues this Award. Applicants must submit proof of contacts made on or after January 1, 1966.

Applicants must obtain eight QSL cards from HA/HG 1, 2, 3, 4 call areas/two cards from each call area/more than one band. Manager: Radio Club HA1KSA, PO Box 79, Gyor, Hungary. H-9001.

Savaria Award
The Radio Amateur Society of Vas County issues this Award. The applicant must submit proof of contacts made on or after January 1, 1976.

Applicants must obtain 10 different HA1 or HG1 QSL cards. Manager: Savaria Radio Club, Puskas Tu7, Szombathely, Hungary. H-9700.

Balaton Diploma/BD
The Radio Club Siofok issues the BD. The applicant must submit proof of contacts made on or after January 1, 1967.

Amateurs must make two-way communication with amateurs indicated under a), b), or c). Stations require 15 points and at least one contact should be with a member of the Radio Club Siofok.
a) Radio Club Siofok and its members count as five points. HA, HG3KGJ, KHL, GI, GJ, GQ, HE, HL, HQ, HZ, IG, IK, IQ, IS, NG, 4XW, 6NP, 8UA.
b) Stations with a permanent station around Lake Balaton count for three points. HA, HG1KXX, XA, XH, XX, ZY, 2KRQ, RQ, RC, SH, Y, YRC, 3KHB, KHO, GG, GO, HK, HO, HU.
c) Any other stations in Zala, Veszprem and Somogy County count one point. HA, HG1KRA-KRZ, KXA-KXZ, KZA-KZZ, RA-RZ, XA-XZ, ZA-ZZ, DRA-DZZ, 2KPA-KTZ, PA-TZ, ENA-EZZ, 3KGA-KIZ, GA-IZ, FLA-FSZ.

Manager: Jozsef Turjanyi HA3GJ, PO Box 78, Siofok, Hungary. H-8601.

Budapest Award/BPA
This Award is issued by the Radio Amateur Society of Budapest. Applicants must submit proof of contacts made on or after January 1, 1959.

Stations must have obtained 25 different QSL cards from HA, and HG5 stations. Manager: Verebes Janosne HA5YR, PO Box 64, Budapest, Hungary. H- 1475.

Hungarian Rummy Diploma/HRD
The Amateur Radio Society of Somogy County issues the HRD Awards. The applicant must submit proof of contacts made on or after September 1, 1972.

The HRD Award is issued in three categories.
BRONZE: "hand rummy" collecting 14 cards in accordance with the rules of the game.
SILVER: full collection of one of the four series plus one Joker of the same colour. For example — diamond 2 . . . A plus red Joker. /14 cards.
GOLD: full pack, containing 54 cards.
HRD-108: two packs of QSL cards are necessary for the Award from 108 different stations.
Hungarian Canasta Diploma/HCD: Three canastas /21 cards, have to be confirmed in accordance with the rules of the game.

The canasta contains seven cards of the same figures, two of them can be equivalent; eg seven cards of figure 5, seven cards of figure 8, and seven cards of Kings. Not more than three cards substituted by the four Jokers and the "little-Jokers"/figure2/ in one canasta.

Note: Contacts on or after April 4, 1980 are valid for the HRD-108 and HCD Awards.

Amateur stations belonging to the radio club of "Tivadar Puskas" can send any kind of HRD card for QSOs. These stations are: HA, HG3 GA, GB, GD, GH, GL, GM, GR, GU, HD, HF, HH, HM, HS, HV, HX, HY, KGC, KGL, KGR, KGU, KHC, KHJ.

Allocation of the HRD cards:

Please turn over . . .

HA HG Call Areas	Spade	Heart	Diamond	Club
1	A		J	
2	2		J	
3	3		J	
4	4		J	
5	5		Q	
6	6		Q	
7	7		K	
8	8		K	
9	9		K	
0	10		K	

? ? ? red and black Joker = Y =

Manager: Jance Mihalyfy HA3GA, PO Box 173, Kaposvar, Hungary. H-7401.

Szeged Festival Award

The Amateur Radio Society of Csongrad County issues this Award yearly for QSOs made between July 1 and August 31, from 0000-2400 UTC. The deadline for applications is December 31, to the manager.

Stations must gain five points from two-way contacts as indicated in a) and b).

a) Stations with permanent residence in Szeged count as two points. /HA, HG8CA, CB, CD, CH, CP, CT, CV, CZ, CX, DC, DE, DF, DP, DQ, DR, DT, DZ, EK, EL, KCC, KCK, KDA.

b) Any other stations in Csongrad County counts as one point. HA, HG8CA-FZ, KCA-KFZ, LSA-LZZ.

Manager: Imre Kelemen HA8CH, PO Box 673, Szeged, Hungary. H-6701.

Worked Hungarian Districts/WHD

The Hungarian Radio Amateur Society issues this Award and applicants must submit proof of contacts made on or after January 1, 1958.

Stations need 10 QSL cards from any five Hungarian call areas/ HA, HG1, 2, 3 . . . 0. Two cards are required from each call area on two bands. Manager: Janos Retkes HA8UB, PO Box 22, Tiszakecske, Hungary, H-6061.

Videoton Award

The Videoton Radio Club issues this Award for applicants who submit proof of contacts made on or after January 1, 1969.

Only HA4 and HG4 QSLs are valid. There are three groups of special cards, 3-4-3 different cards illustrating a BC receiver, a TV receiver and computer set respectively.

This Award is issued in three categories:

— BRONZE: one complete set of any group.
— SILVER: a complete set of any two groups.
— GOLD: all ten cards.

Manager: Halmi Belane HA4XP, Berkes Fltp.40, Szekesfehervar, Hungary. H- 8000.

Dunakanyar Diploma/DD

The Radio Amateur Society of Pest County issues the DD Award. Applicants must provide proof in the form of five different QSL cards from the HA, HG7 call areas. Contacts to be made on or after January 1, 1970.

Manager: PRASZ Award Manager, HA7PL, PO Box 36, Budapest, Hungary. H- 1387.

Hungarian Castle Series/HCS

The Hungarian Radio Amateur Society issues the HCS Award. Applicants must submit proof of contacts made on or after January 1, 1968.

Many Hungarian stations in each call area have special cards for the HCS Award — from number 1 to number 36. It is issued in three categories.

— BRONZE: Numbers 1-12 or 13-24 or 25-36.
— SILVER: Numbers 1-24 or 13-36.
— GOLD: Numbers 1-36.

The application must be accompanied by the confirming piece from the QSL cards.

Repartition of the QSL numbers by call areas is as follows:

HA, HG1 — 7, 22, 25, 31
HA, HG2 — 6, 8, 12, 15, 21, 23, 30, 32, 35
HA, HG3 — 3, 14, 23, 30, 32, 33, 35
HA, HG4 — 17, 23, 30, 32, 35
HA, HG5 — 1, 13, 36
HA, HG6 — 4, 10, 11, 34
HA, HG7 — 2, 5, 19
HA, HG8 — 16, 20, 24
HA, HG9 — 18, 27, 28, 29
HA, HG0 — 9, 26, 29

Manager: Janos Retkes HA8UB, PO Box 22, Tiszakecske, Hungary. H- 6061.

Dunaferr Award

Issued by the Dunaujvaros Radio Club yearly for QSOs with HA and HG4 stations made between April 22 and May 8 from 0000-2400 UTC. The deadline for applications is May 31, to the manager.

Two-way contacts are required as indicated in a), b), c) below. Applicants require 40 points.

a) Club Stations in Dunaujvaros count as three points. HA, HG4KXG, KYJ, KYH, KYP, KYV, YYJ.

b) Individual stations in Dunaujvaros and other club stations from Fejer County count as two points. HA, HG4BG, XG, XU, XX, YA, YI, YJ, YK, YL, YO, YP, YQ, YU, YV, ZE, ZM, ZV and each call sign between HA, HG4KXA-KZZ, YXA- YXZ.

c) Individual stations from Fejer County count as one point. All HA and HG4 stations with a two letter suffix.

Note: This Award/Sticker may be claimed every year anew. Manager: Radio Club Dunaujvaros, Award Manager HG4YI, PO Box 132, Dunaujvaros, Hungary. H- 2401.

There is also an Awards Program for the Hungarian DX Chapter. Further information about these awards may be obtained from HADXA Award Manager, Janos Retkes HA8UB, PO Box 22, Tiszakecske, Hungary. H-6061.

ar

Intruder Watch

Bill Martin VK2COP
FEDERAL INTRUDER WATCH CO-ORDINATOR
33 Somerville Road, Hornsby Heights, NSW. 2077

Last month as I was compiling my 48th monthly *Intruder Watch Summary* for distribution, it occurred to me that this meant four years had passed since I was appointed *Federal Intruder Watch Co-ordinator.* Four years! It seems like only yesterday that I was struggling to put together the first of many such summaries, and trying to get it into some sort of business-like order. In those days, I did it all on a typewriter, which took about 12 hours to complete, after having received all the reports from contributing amateurs and SWLs around Australia. Now I do it on a computer, and it has cut the time by three-quarters. I won't spoil the effect by telling how long it took me to tame the computer! And I rather suspect that the computer is still grinning at my efforts from behind the safety of its monitor screen. But the blank look I get from it sometimes is what I fear most.

CONTRIBUTORS AND INTRUDERS

Many people have contributed reports to the *Intruder Watch* during those four years, and I take this opportunity to say thank you.

Hopefully, these same people, and others, will continue their support in the future. Those who helped last May were:

VK2s BQS, PS, QL, G H A Bradford; VK3XB; VK4s AKX, AV, BG, BHJ, BIW, DA, KHZ, OD; VK5GZ; VK6s JQ, OD, RO, XV, XZ; VK7s DQ, RH; VK8s HA and JF.

Reports broke down as follows:

AM-mode — 419; CW-mode — 134; RTTY — 113; other modes — 75; and 45 intruders supplied us with their call signs.

INTRUDER CALL SIGNS

Norman VK4BHJ, one of the IW's consistent good observers, writes regarding the numerous stations using CW-mode, and originating in Vietnam.

As mentioned in AR, June 1986, these stations, as listed below, are all part of the Vietnam News Agency, Hanoi. The call signs are listed with the country listed in brackets being the country to whom the call is legitimately allocated.

VRQ — (United Kingdom)
VCN — (Canada)
KFB — (USA)
CFK — (Canada)
TRB — (Gabon Republic)
VZC — (Canada)
NBZ — (USA)
PKJ — (Indonesia)
VMO — (Australia)

In other words, these transmissions are not originating in the country accredited the allocation of the call, but are all being used by the Vietnamese News Agency. Still, I suppose if your intention is to ***not*** observe the radio regulations, it doesn't make any difference how many rules you break — that seems to the the typical intruder's philosophy, anyway.

The transmissions for these stations is of the propaganda/news type variety, with NBZ and PKJ very often on the international 20 metre beacon frequency of 14.100 MHz.

So there you are for this month, and I hope you have been having more success with DX than I have! . . . 73.

ar

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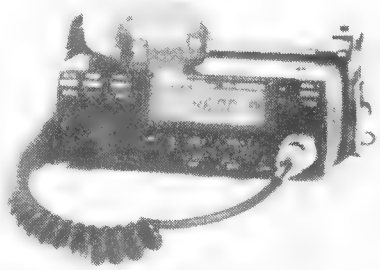
ICOM
Amateur, Commercial and UHF CB Equipment.

ICOM IC-3200A
AR86
(Props. B.M. & B.P. Stares)
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Wendouree, Vic. 3355
PHONE: (053) 39 2808

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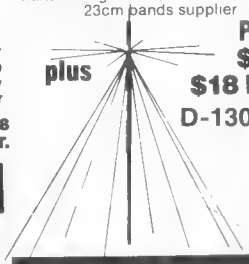
- HANG GLIDERS
- AIR SHOW COMMS
- EXPERIMENTAL

920 CHANNEL NAV COM — PLUS 4 MEMORY SCAN PORTABLE TRANSCEIVER

The New ATC-720X provides inexpensive airband communications for a wide range of applications. Its most important includes promoting the peace of mind which comes from knowing you have an emergency back-up transceiver with you. It is supplied complete with rubber antenna, alkaline batteries and carrying strap **$1188 + S.T. + $18 P&P $1360 inc S.T.**

NEW BROADBAND OMNIDIRECTIONAL ANTENNA 25 TO 1300 MHZ

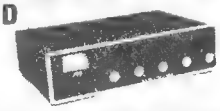
The new D-130 is one of the latest generation full coverage HF/VHF/UHF omnidirectional antennas. It provides continuous operation from 25 to 1300 MHZ and is ideally suited to the likes of the AR-2002 or the ICOM ICR-7000 scanning receivers. Also capable of transmitting on 6m, 2m, 70cm, 33cm & 23cm bands supplier.



PRICE $346 plus $18 P&P

D-130

ANTENNA MATCHER FOR CONTINUOUS HF COVERAGE – MFJ-941D



Apart from being extremely versatile the MFJ-941B includes a 6-position coax-switch, SWR power meter, 4:1 Balun and will feed balanced line, single wire and coaxfeed antennas

$495 + $18 P&P

2 KW DUMMY LOAD

MFJ-250 Low SWR to 400 MHz, 2 KW PEP, supplied with transformer oil.

$199 + $18 P&P

AR-2002 Continuous Coverage 25-550, 800-1300 MHz Scanner

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QUALITY CERAMIC EGG INSULATORS NOW AVAILABLE AT GFS

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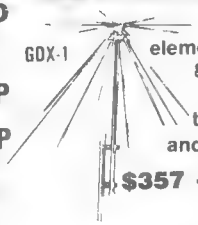

GDX-1; 16 element discone 80-480 MHz suits transmitters and receivers.

$357 + $18 p&p

LOW LOSS FOAM DOUBLE SHIELDED COAXIAL CABLE

LOSS IN DB/30 METRES

TYPE	100 MHz	200 MHz	400 MHz	900 MHz
5D-FB	1.86	2.70	3.90	6.00
8D-FB	1.20	1.74	2.58	3 90
10D-FB	0.99	1.44	2.10	3.30
12D-FB	0 84	1.23	1 80	2 79
RG-8/AU	2.20	3.20	4.70	8.00
LDF-450	0.75	1.40	1.80	2 50

FB SERIES CABLE & N CONNECTORS

CABLE		N-CONNECTORS	
5D-FB	$4.30	NP-5DFB	$24.00 ea
8D-FB	$8.60m	NP-8DFB	$32.00 ea
10D-FB	$11.40m	NP-10DFB	$36.00 ea
12D-FB	$15.60m	NP-12DFB	$39.00 ea

SCAN THE BANDS WITH OUR MICROCOMM SX-155 PROGRAMMABLE POCKET SCANNER

This new unique scanner provides coverage of 26-32, 68-88, 138-176 and 380-514 MHz with a sensitivity of less than 0.5 uV. Four banks of 40 memory channels, total of 160 memories. High scan speed of 16 CH/SEC. Auto search and store mode. Priority channel, 4 hour life on supplied Nicad batteries. 24 hour clock. Selectable Scan/Search delay of 0 1 or 2 seconds. Includes Nicads, charger, carrying-case and antenna

$749 + $18 P&P

HF BROADBAND DIPOLES

New T2-FD series provides continuous HF coverage

200 WATT MODELS

3.5-30 T2-FD 200 is 25m long, 3 5 30 MHz
1 8-30-T2 FD-200 is 30m long, 1 8 30 MHz, **both priced at $205 + $18 P&P**

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3 5-30-T2-FD-2KW is 40m long, 3.5-30 MHz.
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These individually calibrated noise bridges read both inductive & capacitive reactance over a much wider range than the others. Simple to use and covers 1 to 100 MHz **$299 + $18 P&P**

FOR THE RTTY OPERATOR

MDK-17 (KIT) MOD-DEMOD

A high performance RTTY/CW modem kit for use on a computer or teletype. Offers high noise immunity on receive **$199 + $8 P&P (kit) or $290 + $12 P&P (assembled)**

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Versatile RTTY/CW modem, interfaces with a computer and is supplied with software for VIC-20 or Commodore-64 **$495 + $18 p&p**

HF-VHF SWR-POWER METER

HS-260

Compact, two power ranges, 0-12 Watts & 0-120 Watts, switchable HF-VHF with lighted meter **$151 plus $10 P&P**

NEW HS-VK5 5 BAND HF VERTICAL

Fully self supporting & complete with self supporting loaded radials 80, 40, 20, 15, & 10 metres **$538 and $18 P&P**

NEW DEBEGLASS WIRE

What is stronger than wire of equivalent cross section, non corrosive, non conductive, and has virtually no elongation?

Now, guy your tower without having to break the wires with dozens of egg insulators, or worrying about them corroding away due to a salty atmosphere. Our Debeglass wire alternative is made using continuous filament fibreglass yarn, jacketed in UV stabilized vinyl chloride. Compare the figures below

	DB-4 (4mm)			DB-5 (5mm)		
	Core diam (mm)	Wt of 200mm (gm)	Tensile Str (kg)	Core diam (mm)	Wt of 200mm (gm)	Tensile Str (kg)
Deceglass	2.5	3.9	430	3.0	6.1	560
Steel wire	2.5	5.6	370	3.15	9.1	750

DB-4 (4 mm) $0.82m DB-5 (5 mm) $1.16 DB-6 (6 mm) $1.98 Debeclip Termination Clip to suit DB4, DB5, DB6 $7.50 each. Simple to use Debelock termination for all sizes $2.50 each.

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AMSAT Australia

Colin Hurst VK5HI
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OSCAR-10 APOGEES
SEPTEMBER 1986

DAY #	ORBIT #	APOGEE U.T.C HHMM:SS	SATELLITE CO-ORDINATES LAT DEG	LON DEG	BEAM HEADINGS SYDNEY AZ DEG	SYDNEY EL DEG	ADELAIDE AZ DEG	ADELAIDE EL DEG	PERTH AZ DEG	PERTH EL DEG
0th September										
243	2419	2052:01	-17	267	273	28	282	39	301	60
1st September										
244	2421	2011:04	-17	258	279	36	290	47	318	67
2nd September										
245	2423	1930:07	-17	248	286	44	300	55	345	71
3rd September										
246	2425	1849:09	-17	239	295	52	315	62	18	71
4th September										
247	2427	1808:12	-16	230	308	60	336	67	44	66
5th September										
248	2429	1727:14	-16	220	327	66	3	68	60	59
6th September										
249	2431	1646:17	-16	211	353	69	30	66	70	50
7th September										
250	2433	1605:19	-16	202	22	68	49	60	78	42
8th September										
251	2435	1524:22	-16	192	44	63	62	53	84	33
9th September										
252	2437	1443:23	-16	183	59	56	71	44	89	24
10th September										
253	2439	1402:26	-16	173	69	48	79	36	94	16
11th September										
254	2441	1321:28	-16	164	77	39	85	28	99	8
12th September										
255	2443	1240:31	-16	155	83	31	90	20	103	-0
13th September										
256	2444	0020:02	-16	330					259	3
256	2445	1159:34	-16	145	89	22	95	11		
256	2446	2339:05	-16	321					263	11
14th September										
257	2447	1118:36	-15	136	94	14	100	4		
257	2448	2258:08	-15	311			257	0	268	19
15th September										
258	2449	1037:39	-15	127	99	6				
258	2450	2217:10	-15	302	256	-3	262	8	273	28
16th September										
259	2451	0956:41	-15	117	104	-2				
259	2452	2136:13	-15	292	261	5	268	16	279	36
17th September										
260	2454	2055:15	-15	283	266	13	273	24	286	45
18th September										
261	2456	2014:18	-15	274	271	21	279	32	295	53
19th September										
262	2458	1933:20	-15	264	276	29	286	40	308	61
20th September										
263	2460	1852:23	-15	255	283	37	295	48	328	67
21st September										
264	2462	1811:26	-15	246	291	46	307	56	355	70
22nd September										
265	2464	1730:28	-15	236	301	53	323	62	25	68
23rd September										
266	2466	1649:31	-15	227	315	60	345	66	46	62
24th September										
267	2468	1608:33	-14	217	336	65	11	66	61	55
25th September										
268	2470	1527:36	-14	208	2	67	34	62	70	47
26th September										
269	2472	1446:38	-14	.199	27	65	51	56	78	38
27th September										
270	2474	1405:41	-14	189	47	59	63	49	84	29
28th September										
271	2476	1324:44	-14	180	60	52	72	41	89	21
29th September										
272	2478	1243:46	-14	171	70	44	79	32	94	13
30th September										
273	2480	1202:46	-14	161	77	35	85	24	98	4

NATIONAL CO-ORDINATOR
Graham Ratcliff VK5AGR
INFORMATION NETS
AMSAT AUSTRALIA
Control: VK5AGR
Amateur Check-In: 0945 UTC Sunday
Bulletin Commences: 1000 UTC
Winter: 3.685 MHz — Summer: 7.064 MHz
AMSAT PACIFIC
Control: JA1ANG
1100 UTC Sunday
14.305 MHz
AMSAT SW PACIFIC
2200 UTC Saturday
21.280/28.878 MHz

Participating stations and listeners are able to obtain basic orbital data, including Keplerian elements from the AMSAT Australia Net. This information is also included in some WIA Divisional Broadcasts.

ACKNOWLEDGMENTS
Contributions this month are from *AMSAT-Telemail*, Graham VK5AGR, and Bob VK3ZBB.

JAS-1
The following item was posted to the *AMSAT-Telemail* bulletin board by Harry Yoneda JA1ANG.

The Japanese Amateur Radio League (JARL) JAS-1 OSCAR satellite is still scheduled for launch on July 31, 1986, at 2030 UTC. The lift-off pad for Japan's H-1 launch vehicle is located on Tanega Shima Island off the coast of South Kyushu, at 30D 23M 45S north latitude and 130D 58M 22S east longitude.

This is Test Flight #1 (TF-1) for NASDA's two-stage H-1 vehicle. In addition to JAS-1, it will carry a payload called EGP (an orbiting mirror ball) and a payload called MB FW (or magnetic bearing flywheel).

The July 31, 1986, launch window will be from 2030 to 2200 UTC. Later windows, if required, will occur from August 1, 1986, through to September 14, 1986. However, the dates August 20, 1986, through to August 26, 1986 and September 6, 1986, through to September 14, 1986, are reserved for Institute of Space Research launches.

Following is the TF-1 sequence of events after lift-off. The launch vehicle will, at event #20, be in an elliptical orbit with an apogee of 1511 km and perigee of 271 km. The second burn of the second stage at event #27 will circularise the orbit at approximately 1503 km. The JARL JAS-1 OSCAR satellite will separate at event #34 and immediately turn on its 435.795 MHz PSK modulated beacon.

SE-ID	Event Description	HH MM SS	Range	Alt	Vel
1	Lift Off	00 00 00	0	0	0.4
2	Start Roll Program	00 00 03			
3	End Roll Program	00 00 08			
4	Start Roll/Pitch/Yaw Program	00 00 08			
5	End of Burn for 6 Solid Fuel Boosters	00 00 39	0.8	5	0.5
6	Ignition of 3 Solid Fuel Boosters	00 00 40			
7	End of Burn for 3 Solid Fuel Boosters	00 01 19	8	18	0.8
8	Separation of 9 Solid Fuel Boosters	00 01 28			
9	End Roll/Yaw Program	00 01 31			
10	End Pitch Program	00 04 18			
11	End of Burn for Main Engine	00 04 30	301	111	4.0
12	End of Burn for Vernier Engine	00 04 36			
13	Separation of First	00 04 38	329	119	
14	Ignition of 1st Burn — 2nd Stage	00 04 42			
15	Separation of Fairing	00 04 54	387	134	
16	Start Roll/Yaw Program	00 05 00			
17	End Roll/Yaw Program	00 05 50			
18	Start Pitch Program	00 05 50			
19	End Pitch Program	00 10 08			
20	End of 1st Burn — 2nd Stage	00 10 14	1992	342	8.0
21	Start Inertia Flight Pitch Program	00 10 46			

OSCAR-10 APOGEES
OCTOBER 1986

DAY #	ORBIT #	APOGEE U.T.C HHMM:SS	SATELLITE CO-ORDINATES LAT DEG	LON DEG	BEAM HEADINGS SYDNEY AZ DEG	SYDNEY EL DEG	ADELAIDE AZ DEG	ADELAIDE EL DEG	PERTH AZ DEG	PERTH EL DEG
1st October										
274	2482	1121:49	-14	152	83	27	90	16		
274	2483	2301:20	-14	327					262	4
2nd October										
275	2484	1040:51	-14	142	89	19	95	8		
275	2485	2220:23	-14	318					267	12
3rd October										
276	2486	0959:54	-14	133	94	11	100	0		
276	2487	2139:25	-14	308			260	1	272	21
4th October										
277	2488	0918:56	-14	124	99	3				
277	2489	2058:28	-13	299	259	-1	266	9	277	29
5th October										
278	2491	2017:30	-13	290	264	6	271	17	283	38
6th October										
279	2493	1936:33	-13	280	269	14	277	25	291	46
7th October										
280	2495	1855:35	-13	271	274	22	283	33	301	54
8th October										
281	2497	1814:38	-13	262	280	30	291	41	316	61
9th October										
282	2499	1733:41	-13	252	287	39	300	49	337	66
10th October										
283	2501	1652:43	-13	243	296	47	313	56	4	67
11th October										
284	2503	1611:46	-13	233	307	54	331	61	30	65
12th October										
285	2505	1530:48	-13	224	323	60	353	64	48	59
13th October										
286	2507	1449:51	-13	215	345	64	17	63	61	51
14th October										
287	2509	1408:53	-12	205	9	65	37	59	70	43

22	End Inertia Flight Pitch Program	00 13 16			
23	Start Inertia Flight Yaw Program	00 13 16			
24	End Inertia Flight Yaw Program	00 14 16			
25	Start Inertia Flight Roll Program	00 14 16			
26	End Inertia Flight Roll Program	00 14 46			
27	Ignition of 2nd Burn — 2nd Stage	00 54 33	17831	1508	6.8
28	End of 2nd Burn — 2nd Stage	00 54 54	17930	1507	7.1
29	Start Inertia Flight Roll/Pitch Program	00 55 44			
30	End Inertia Flight Roll/Pitch Program	00 57 14			
31	Separation of EGP Payload	00 59 21	18955	1505	7.1
32	Start Inertia Flight Yaw Program	01 00 27			
33	End Inertia Flight Yaw Program	01 01 17			
34	Separation of JAS-1 Payload	01 02 07	21161	1503	7.1
35	Switch on Experimental Flywheel	01 02 08			
36	Start Inertia Flight Roll/Pitch Program	01 02 47			
37	End Inertia Flight Roll/Pitch Program	01 04 02			
38	Change Attitude of 2nd Stage to Vertical				
39	End of 2nd Stage Control				

SEQ — Event sequence
HH MM SS — Hours Minutes Seconds after liftoff
RANGE — From launch site in km
ALT — Altitude in km
VEL — Velocity in km/s

For the latest news on JAS-1 listen to the AMSAT-Australia Net.

OSCAR-10 AGAIN FULLY OPERATIONAL

Regular users of OSCAR-10 will be aware that the "bird" is again fully operational. Following a complete analysis of the problems on board the spacecraft, Karl DJ4ZC, has rewritten the software for the onboard computer.

However, behind the scenes the experts have all been scratching the "gray matter" in an endeavour to find the best solution to the problem.

The following analysis and proposal was prepared by Ron Dunbar W0PN, a member of the world-wide command station group. They are his personal opinions and do not necessarily reflect the opinions of all AMSAT Engineering personnel. However, it is an insight into the considerations that the command personnel are faced with as an ongoing day to day analysis so that "we the communicators can do our thing."

OSCAR-10 Analysis and Proposals — Ron Dunbar W0PN, June 17, 1986

1.0 Current Status of AO-10

AMSAT-OSCAR 10 was three years of age yesterday. Despite a beginning which seemed to be ruled solely by Murphy's third postulate, the S/C has performed as well as could reasonably be expected, considering the bent antennas, less than optimal orbit, frozen 'O' rings, etc.

The satellite was designed with reliability as one of the foremost objectives. Since previous birds had succumbed due to eventual battery failure, two sets of batteries were placed on board; 10 main batteries and 10 auxiliary batteries. To date, the main cells have performed so well that there has been no need to bring the auxiliary cells online. Premature charging of the auxiliary cells would merely serve to start their "lifetime countdown" therefore, they have never been charged in orbit.

As the spacecraft aged, the effects of the high perigee (4000 km instead of the desired 1500 km) began to be noticed; at this altitude, the S/C spent significantly more time traversing the radiation-filled Van Allen belts surrounding the Earth. Each trip through this area resulted in continuous doses of undesirable radiation being experienced by most onboard components. The effects of such radiation are cumulative. The overall level of radiation induced charge keeps adding to the previous exposures..

The Integrated Housekeeping Unit (IHU ... speak 'onboard computer') memory chips are the most susceptible to excess charge of all the onboard components, since they function by storing a definable charge to represent a one or zero in a particular memory location. Over a period of time, random bits throughout the 16k memory began to fail. This did not present a disaster, since the S/C designers had included sophisticated error correction circuitry for just such an expected eventuality. The correction circuitry could detect and 'repair' a single-bit error in any given Byte of memory. It would detect, but not repair, a double-bit error per Byte.

On May 17, 1986, the error correction circuitry was apparently overwhelmed by the damaging effects of an influx of high energy particles from the Sun. The software Operating System had lost control with the Mode B transponder locked on and strings of meaningless bits being transmitted on the beacon.

As a result of many hours of diagnosis and attempts to correct the situation by ZL1AOX and others, a limited function software system was reloaded. Subsequently, limited memory tests were performed in an attempt to assess the extent of the damage and suggest methods of bypassing the faulty areas of memory.

Before these tests could be completed, the S/C was apparently subjected to yet another bombardment of radiation which reduced even the minimal operating system to an essentially useless state. In this state, the transponder and beacon are occasionally activated in an uncontrolled manner. Subsequent heavy usage by ground stations then leads to a low battery voltage condition which prevents Command Stations from being able to communicate with the IHU.

Finally, on May 19, ZL1AOX was able to deactivate the transponder and beacon, which is the current condition (providing they have not anomalously activated again by the time of this writing).

The Battery Charge Regulator (BCR) control inputs are uncertain, since no telemetry is being received by the Ground Command Stations. This means that we have no way of knowing what the battery conditions or charge rates actually are, however, even if the computer-controlled latches have been reset to zero, a hardware default setting exists which is determined by a string of resistive voltage dividers. If the BCR control latches should anomalously be set to all ONEs, there exists the possibility of OVER- charging the batteries with potentially disastrous effects due to the gas pressure build-up within the batteries themselves. This pressure is normally vented, but vents have been known to plug up, sometimes leading to a condition known as 'fast rise-time pressure relief' (aka 'explosion').

As you will come to see in the paragraphs to follow, an UNDER-charge condition has a minimal long term effect; such is *not* true with a sustained OVER-charging condition. The potential of overcharging should be avoided if at all possible, due to the permanent damage which could result. Under certain conditions, UNDER-charging *can* be of actual benefit, as we shall see.

2.0 Forecast of Events Through September 1986

Given the current attitude of the spacecraft, the position of the orbital plane and the orbital parameters, the sun angle will change from the current value of approximately -8 degrees to -49 degrees by 7/31 and to the NO POWER condition of -90 degrees on 9/11 as indicated by the following chart (courtesy G3RUH).

Date 1986	SUN ANG (deg)	ALON (deg)	ALAT (deg)
May 22	18	157.5	21.7
Jun 5	4	156.1	21.7
Jun 19	-9	154.8	21.7
Jul 3	-22	153.4	21.5
Jul 17	-36	152.1	21.4
Jul 31	-49	150.7	21.2
Aug 14	-62	149.3	21.0) 47% Illum
Aug 28	-75	147.9	20.7) 26%
Sep 11	-90	146.5	20.4) OOPS!
Sep 25	-76	145.1	20.1)

"An attitude change is ESSENTIAL before the end of July" (G3RUH).

If no intervention occurs, the S/C will reach a power down condition sometime prior to September 11. At first glance, this might seem to be a disastrous event; let us analyse this condition a little more thoroughly.

Of the many events which will occur at or near the -90 degree sun angle, the following are of most concern:

2.1 Thermal stresses

2.2 Low/no power considerations
2.3 Erratic IHU operation during transition period

2.1 Thermal Considerations
From a sun angle of -45 degrees through -90 and back to -45, the sun will primarily be shining in the bottom of the S/C (rather than on the solar panels), resulting in a significant heating of that surface, while the opposite surface will suffer a deep-freeze effect. The resultant temperature of important internal modules (IHU, batteries, BCRs, etc) will reach temperatures dependent on the thermal transfer characteristics of their housings, mounting brackets, etc.

We already possess telemetry data of a similar event which took place right after the initial launching of AO-10. Analysis of that TLM data is being performed by Command Stations right now. AO-10's thermal design expert (Dick Jansson WD4FAB) will be contacted as soon as he gets back to the Continental USA on Saturday. He should be able to shed valuable light on this important subject.

NiCAD battery expert, John Fox W0LER, advises that this should make little if any difference whether the batteries are charged or discharged when they are subjected to the expected thermal stress.

2.2 Low/No Power Consideration
From both a battery and an IHU long-term 'health' viewpoint, it appears that a complete power down condition could well provide major benefits.

2.2.1 Batteries
The auxiliary batteries have never been charged; their condition should remain essentially unaltered through a forced power down situation. By the time power totally fails, the main batteries will likely have developed the notorious NiCAD 'memory' for partial charging.

Fortunately, if each cell discharges to a level of 0.2 volts or lower, (2.0 volts for the total array of 10), all 'memory' will be erased. In addition, laboratory tests by W0LER have shown that up to 85 percent of original (new) capacity can be expected from the aged cells when they are recharged once again.

W0LER further advises that he has never witnessed polarity reversal during such deep discharge/recharge cycles. (John's wisdom was gained from a five year period of daily measurement and painstaking record-keeping on this very subject).

Providing there are no disastrous temperature effects of which I am unaware, it would appear that the main batteries will actually BENEFIT from the power-down situation.

2.2.2 IHU
According to several knowledgeable individuals in the computer industry, there is a reasonable chance that the disabling excess charge on the memory chips may actually BLEED OFF if power is completely removed from the memory for at least a 24 hour period.

If this fortunate state is actually realised, we could optimistically expect to end up with a rejuvenated memory when the S/C powers up again (good for another three years?).

2.3 Erratic IHU Operation During Transition
Once the IHU supply voltage begins to fall, there is a rather narrow 'window' that exists in the shadow region between the functional and the stopped IHU states. In tests on nearly identical (simulator) IHUs in a terrestrial environment, operation was essentially normal down to the 6.0 volt level, erratic and unpredictable from 6.0 to 5.2 volts and totally inoperative below that supply voltage level.

The erratic window region does generate a certain amount of concern; in this region, the CPU may do anything. It may perform anomalous jumps to erroneous program steps, it may perform erratic I/O operations with potentially harmful results; Murphy's Law is strictly enforced in this region. The most harmful thing which can be imagined will most likely be realised.

There are certain techniques which can reduce this hazard; they will be addressed later. The major point to be made here is that the time spent in this 'transitional area' should be minimised by any means possible.

3.0 Corrective Actions Available
3.1 Do nothing until after September 15, 1986
If we merely wait until the inevitable occurs, we stand the very good chance of even further memory deterioration with the attendant prospect of not being able to do anything about S/C attitude or onboard conditions. Erratic IHU operation will take place anyway; main battery discharge will occur. The AMSAT Satellite User Group will become increasingly frustrated and discouraged and begin to seek other interests after we fought so hard to get their attention in the first place. Knowing this organisation, I do not expect many votes for this option.

3.2 Perform Memory Diagnostics and Attempt a Patched Operating System
While there will probably be a significant amount of support for this alternative, there are good reasons to perform some tough objective analysis before embarking on this route. The time and effort to perform this task is indeed formidable. The chance of long-term success in this direction seems small, indeed. By the time a thorough memory analysis is performed (if it can even be done at all), further radiation damage will probably have already occurred, thus rendering the analysis useless. In addition, this activity would necessarily involve personnel who are already swamped with Phase-3C activities. Time stolen from Phase-3C could well lead to a situation of similar consequence a few years from now with the next satellite.

Power Down as Soon as Practicable
As long as the first three Bytes of memory remain functional, we should be able to uplink simple assembler language routines to perform one to a few functions at a time. It would be necessary to periodically run a memory diagnostic on at least a portion of memory as insurance. Some of the functions which are considered most important are:

3.3.1 Memory diagnostics
3.3.2 Limited telemetry
3.3.3 Transponder and beacon control (No transponder usage)
3.3.4 BCR service to control battery charge rates
3.3.5 Minimal attitude and spin-rate control

Functions 3.3.1 to 3.3.5 can probably be performed by the Ground Command Station (GCS) group with only minimal assistance from the spacecraft development team, thus freeing them to concentrate on 'hardening' the Phase- 3C bird.

Proposals, Rationale and Probable Benefits
With the information currently available to me, I propose that alternative (3.3) be implemented under the following conditions:

4.1 Bring the spin rate up to 45 or 50 RPM for maximum long-term stability.
4.2 Intentionally begin changing the S/C's attitude toward a -90 degree sun angle to shorten the total 'outage' period.
4.3 When the IHU supply voltage begins to drop below it's normal 10 volt level, activate the transponder and beacon, then load all of memory with a benign instruction code and 'hang' the CPU in a tight loop to minimise the chance for erratic behaviour.

The purpose of activating the transponder and beacon is to hasten the discharge process as much as possible, thus shortening the amount of time the IHU will spend in the potentially dangerous 'erratic window' region of supply voltage. Selected users would be encouraged to assist in this rapid discharge process by uplinking with a 100 percent duty cycle.

The benefits to be gained via this method are seen to be:

4.4 We reduce the time span where the IHU might perform a highly undesirable, unpredictable and uncontrollable action such as reducing the spin rate to 0 by activating all magnet coils in a DC state, rotating the antennas away from the Earth, overcharging the batteries by erroneously setting the BCR control latches, etc.
4.5 We at least have a chance of 'complete' recovery in a relatively short time frame which would serve to enhance AMSAT's stature in the eyes of the users, benefactors and the space agencies.
4.6 We reduce the numbers of satellite enthusiasts who will tend to abandon all hopes of AO-10's recovery and switch over to RS satellites as a permanent alternative.

While (4.5) and (4.6) may seem superfluous to the technical purist, in objective terms, it must be remembered that, without the support of these groups, our satellite service would (will) not exist!

Solicitations
Needless to say, there are many problems to be worked out and Murphy will see to it that major hurdles will present themselves, no matter which alternative is pursued. AMSAT consists of a diverse group of specialists covering a wide range of expertise. Your comments and suggestions are solicited immediately. If you feel your idea has merit, do not hesitate to send it along, no matter how 'wild' the scheme may sound. I cannot promise to reply to each and every suggestion or comment, but I do promise to study each and every one and present them to the appropriate parties.

73, Ron Dunbar W0PN, 6012 E, Superior Street, Duluth, MN, 55804

UOSAT DATA BOOKLET

A new, revised and enlarged edition of the UoSAT Data Sheets have been produced by the UoSAT team and is now available from AMSAT- Australia as a 40-side booklet on receipt of a donation of $5 to AMSAT- Australia, C/- Box 1234, GPO, Adelaide, SA. 5001.

Contents are as follows:

Section	***Contents***
1	UoSAT-OSCAR-9 (UOSAT-1) Mission Summary
2	UoSAT-OSCAR-11 (UOSAT-2) Mission Summary
3	UoSAT-OSCAR-9 (UOSAT-1) Technical Data Summary
4	UoSAT-OSCAR-11 (UOSAT-2)Technical Data Summary
5	UoSAT Orbits and Tracking
6	UoSAT-OSCAR-9 (UOSAT-1) Spacecraft Data Formats
7	UoSAT-OSCAR-11 (UOSAT-2) Spacecraft Data Formats
8	UoSAT Whole-Orbit-Data (WOD)
9	UoSAT Spacecraft Telemetry Calibration Equations
10	UoSAT-OSCAR-11 (UOSAT-2) Digital Communications Experiment
11	UoSAT CCD Camera and DSR Experiments
12	UoSAT Ground-Station Equipment

There were 720 copies posted from UoS in the first week of June to all those on the UoSAT Mailing List. If you believe that you are on the list, please allow for postal delivery before requesting a copy as one may already be in the mail!

PHASE IIIC LAUNCH SCHEDULE

The launch failure of a European Space Agency Ariane-2 rocket on May 30, will have some effect on the schedule for Phase-IIIC launch. AMSAT is manifested to fly the first Ariane-4 launcher this November. However, it is now certain the launch of Phase-IIIC aboard the V21 mission will be pushed into 1987. Ariane-space officials said it would be at least two months and up to six months or more before launches could resume.

Meanwhile, it has been suggested that AMSAT may take advantage of the schedule slack to effect some improvements in the satellite. For example, while improvements in the IHU radiation hardness has been discussed for months (long before the current IHU failure episode unfolded in May) a tight schedule limited efforts that could be brought to bear on the problem. Now, with an apparent launch stand-down of several months at hand, serious consideration is being given to rebuilding the IHU with newer, harder memory chips. The memory might also be increased from the current 16k to 32k. These changes would result in a more reliable, flexible IHU.

The delay in the launch may also allow refinement of other hardware matters that at present could use some tweaking. For example, the Mode S transponder efficiency might be raised.

de Colin VK5HI

SATELLITE ACTIVITY FOR THE MONTH OF MAY 1986

1. LAUNCHES

The following launching announcements have been received:

1986-033A (16717)	Cosmos 1742	May 14	USSR
1986-034A (16719)	Cosmos 1743	May 15	USSR
1986-035A (16722)	Soyuz TM	May 21	USSR
1986-036A (16724)	Cosmos 1744	May 21	USSR
1986-037A (16727)	Cosmos 1745	May 23	USSR
1986-038A (16729)	Ekran 15	May 24	USSR
1986-039A (16735)	Meteor 2-14	May 27	USSR
1986-040A (16737)	Cosmos 1746	May 28	USSR
1986-041A (16745)	Cosmos 1747	May 29	USSR

2. RETURNS

During the month 22 objects decayed including the following satellites:

1974-092A	Molniya 3-1	May 15
1983-051A	Exosat	May 06
1986-033A	Cosmos 1742	May 28

QSP

MEMBERSHIP INCREASE

In the past 12 months, ARRL membership has increased to 139 910, a 10 000 member increase from last year. (The 1985 total was 129 698). As at May 31, 1986 there were 126 281 Full Members, 10 982 Associate Members and 2 638 subscriptions.

PACKET LICENSING

Digipeating and mailboxes are not now legal in the UK. The RSGB has been negotiating with the DTI for several months to try to find an early solution to this problem. Initial talks proposed that a frequency or frequencies on 70 cm be allocated to the packet network, but this was not allowed, because amateur radio is a secondary user of 70 cm. The other choices were to go up to the microwave bands or down to two metres. Two metres is very crowded in the UK (the band is only 2 MHz wide), and so this is not a long-term solution to UK packet networking needs. However, establishing a new mode on what would be for most people a new band (24 GHz is the first amateur primary band up from two metres) was equally undesirable. The compromise was to find two channels on two metres which could be used for a couple of years while packet radio gets started. These frequencies are 144.650 and 145.275 MHz, and they will be the home of the experimental packet-radio network until the end of 1987, at which time the network will move to another band.

From *Gateway*, Vol 2, No 22, June 27, 1986 and written by Jeff Ward K8KA. Jeff is a former editor of *Gateway* and is presently working on the UoSAT project at the University of Surrey, England.

From left: Ken Guallager, Sam Voron VK2BVS, the Ambassador of Mexico, Martin VK2PJW and Colin Henderson. They were presented with Awards from the President of Mexico, Miguel de la Madrid, on behalf on the many amateurs who made disaster communications possible between Australia and Mexico during the 1985 Mexican Earthquake.

TECHNICAL MAILBOX

This month, the Technical Editors are pleased to introduce a new column to the pages of *Amateur Radio*. The column's intent is to provide answers to matters that may have bothered you for some time. In providing such answers, it will benefit us all. If you have a question, it would be safe to say that other readers may be in a similar predicament.

There will be no direct correspondence undertaken and all replies will be published in *Amateur Radio*. Naturally we reserve the right to refrain from providing a response where the situation dictates.

Keep your queries specific so our replies can be kept to a minimum without the need for diagrams. You can, if you wish, remain anonymous to readers.

We hope to keep you humorously informed!

Now it's up to you. Your feedback may well help to raise topics that could lead to a full-blown technical article written by an expert in that particular field. Your Editor is most adept in applying the thumbscrews!

Address your letters to *Technical Mailbox, Amateur Radio, PO Box 300, Caulfield South, Vic. 3162.*

Dear Jim VK4Z . ., Poeppels Corner, Qld.

I don't believe that increasing the height of your 144 and 432 MHz stacked Yagi arrays will result in the contacts you desire! Perhaps you should consider OSCAR 10 (when it becomes functional again) or even go the full circle and try EME. Even upgrading to AOCP would provide a HF outlet and a contact or two.

However, the method of feed you are using is far from optimum and explains why you have a slewed pattern and poor performance.

It is not good practice to use a half gamma feed on Yagi arrays especially when stacking is undertaken.

Your answer lies in providing a balanced feed. Here you have several options. Double gamma, Delta fed dipole, folded dipole or a folded dipole of differing dimensions. All of these will provide a balanced feed of varying, but adjustable impedance. Depending upon your feed line, be it coaxial cable or open line, you can then transform your feed impedance to match your line by means of a balun. Additionally, a Q-bar section can be used in difficult situations.

Coaxial cable baluns are simple to construct, broadband, and have a low loss if you do it right! Know your cable and its velocity factor and fashion with due care and precision.

Great! It works fine — until it rains! ! ! I know you sealed it with silicone rubber and it still looks okay! Well Jim, you selected the wrong type. You should have used a non-toxic (inert) type. Generally speaking, this should be indicated on the tube — anyhow, your nose is a good guide. If you detect an acetic acid type smell, you can bet it is the wrong type. You can also obtain a pretty good guide (if you have a microwave oven) by putting some on a plate and placing it in the microwave for two minutes. If you cannot see across the kitchen for smoke it is not the correct type! This test, of course, should be undertaken with extreme care — wives are prone to become a little stroppy and show little understanding for such scientific research! ! !

Since you now have water in your balun and most likely the top half-metre or so of the feedline, despatch the balun to the bin, prune your feedline and start again.

Finally, long Yagis (over 3.5λ) have very low feed impedances (as low as five ohms in certain configurations). To minimise losses resulting from low impedance transformation, it is a good policy not to use balanced gamma matching, but stick to a folded dipole type feed. Use a 3:1 or 4:1 balun (as appropriate) to bring the feed impedance down to 50 ohms.

Remember a coaxial sleeve balun is always more efficient than a balun constructed from coaxial cable, and is well worth the effort if you are serious about performance.

Oh, and *don't* alter your first director or reflector spacings with respect to your radiator to obtain a match! Similarly, avoid television ribbon or open wire. Consider Belden 9914 (50 ohm coax). It is relatively cheap and its loss approaches half-inch heliax.

Dear Fred VK6 . . .

Regarding your query for a high current 12 volt source to run your various pieces of equipment (IC751, IC251, etc).

Firstly, you were well advised not to get one of the units with the in- built 240 volt AC supply as it is true that the switched mode power supply can cause induced noise into the adjacent PLL circuitry.

I would suggest that your cheapest approach may be in obtaining a car battery of sufficient size (viz 60 Ah). Don't get one of the "torch batteries" found in most small cars these days.

Float the battery with a low current regulated power supply. There have been numerous circuits published and a pretty basic design will suit. Consider making it variable from 4.5-18 volts at approximately five amps and then you can use it for logic work if you are into this field.

Finally, remember to take special care of your battery by providing protection from acid spills, adequate and correct fuse protection, and sufficient ventilation. Remember the dangers when using such a high energy source. *Dear Newham VK4 . . .*

No, the rig you obtained from the disposals source is probably not going to catch fire. From your description it appears that the red glow is coming from a device called an electron tube. You will most likely notice that this glass thing has a cap on its top. This is what is termed an anode. You should avoid contact with this as the voltage is much higher than the conventional collector voltage with which you are familiar.

Contact with this anode would reduce our amateur ranks by one!

Regarding the purple glow you have also mentioned I don't believe it is a radio-active source as you postulate but rather it is the glow emanating from a gaseous voltage regulator or mercury rectifier. The latter, if it also has a cap on it should be avoided, for this bites too.

These ugly things could be described as high voltage zener or silicon diodes with which you are undoubtedly familiar.

For further information try and obtain an early copy of the *ARRL Handbook* or contact a nearby Old Timer for advice.

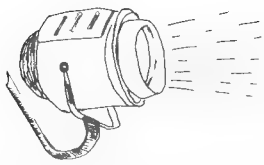
Be careful, we hope to hear from you again.

COMPUTER OPERATED AMATEUR RADIO STATION

Larry "Tree" Tyree N6TR, of Beaverton, Oregon, used what may have been the first completely automated computer operated amateur radio station during a Field Day this year.

N6TR made a number of CW contacts using a Z80-based computer and some experimental software which ran a TS-430 transceiver using battery power without the need for any human assistance. The software tunes the receiver, locates the station to call (it only answers CQs so far) completes that QSO, prints out a record of the contact and continues to scan for a new QSO. N6TR notes that there is still a long way to go before it can come close to matching a human operator!

From *The ARRL Letter*, July 7, 1986



Spotlight on SWLing

Robin Harwood VK7RH
5 Helen Street, Launceston, Tas. 7250

Quite a lot of interest has been shown lately in new legislation, which has been enacted throughout the world, protecting the rights of utility users of the spectrum. This legislation aims to strengthen the privacy provisions of their traffic, and persons who intercept it and divulge its contents, face severe penalties. This will affect those who are primarily interested in Utility DX. Many have sent in reports to these services, hoping for a QSL card or verification. But now, these services are likely to ignore SWL reports, they do not need them anyway! Some utilities have complained to the national administration from where the report emanates, asking for action. This, I believe, has happened in some cases.

COULD BE CONFISCATED

Here in Australia, the new Radiocommunications Act is now law. This has stronger teeth than the previous legislation which had existed for some time. Under the terms of the new act it is illegal to have an unlicensed transceiver or sender. However, the DOC states that ownership of a transceiver by an SWL, who is genuinely studying for their licence, would not be an offence provided that the transmit-side is disabled; ie the final tubes or transistors are disconnected. As well, all transmitting equipment will be issued with an identification label by DOC which must be prominently displayed on, or near, the equipment. Equipment without this appropriate identification will be regarded as illegal, and be confiscated.

PREVENT SALES OF DECODING EQUIPMENT

To protest their privacy many utility users are scrambling their signals, particularly on VHF/UHF. Sales of scrambling devices are booming, particularly in Europe and the USA, with legislative back-up to prevent sales of decoding equipment to unauthorised individuals or agencies. This is apparent on HF, that digitisation of phone traffic has increased, especially with military or sensitive agencies.

Although there is nothing to stop you listening in to these stations, I do strongly recommend that you keep the traffic to yourself, otherwise you could be in trouble. I further recommend that you desist from forwarding reports to these utility services, and concentrate on international or domestic broadcasters, amateurs or CBers, instead. It is interesting to note that possession of RTTY decoders and other ancillary equipment by SWLs is illegal in many countries. We are indeed fortunate in Australia. Let us not abuse that privilege.

HAPPY ANNIVERSARY

Two Australian DX Clubs recently celebrated their anniversaries: the *Southern Cross Club,* in Adelaide, had their 13th during July, and *DX Australia* also celebrated their fourth. The *Australian Radio DX Club* was 20 in June. Congratulations to all concerned.

AM-STEREO

Some months ago, I reported *Radio NDXE* had postponed their opening until later this year. Well, I received news that they are hopeful of commencing on October 15. No frequencies or times are available yet, but they should receive their Continental senders this month and operational tests should be heard. Don't forget they are planning to be the first station to use AM-Stereo on shortwave. They will be using the Kahn-system, which is different from the Motorola Am-Stereo on MW in Australia and the States.

Conditions of late have not altered significantly, although there are indications of an improvement. The sunspot count is slowly increasing. I must say that I am surprised that my puny 100 watts and G5RV get into Oregon consistently on the Australian-American Traffic Net, although at strength five. Stations further within the continental USA are unable to hear me, nor are they as strong as Troy K7OVK. Canadians are quite good also. Europeans are particularly conspicuous by their absence on 14 MHz, although 7 MHz propagation to that area is quite good at that time.

Signals via the Antarctic path were very disappointing around 0200 UTC this winter, certainly not as good as in previous years.

Well, that is all for September. It is good that Spring is here. We hope that conditions are improving. Until next time, the very best of DX and 73 — Robin VK7RH.

Education Notes

Brenda Edmonds VK3KT
FEDERAL EDUCATION OFFICER
56 Baden Powell Drive, Frankston, Vic. 3199

I recently canvassed opinions from Divisions and some groups about possible changes in arrangements for examinations. I would be interested in receiving a response from readers, too.

It has been suggested that the Institute should become involved in the running of examinations. Instead of the regular four examination dates per year, we would like to be able to arrange examinations to suit the classes and instructors. We envisage a Division or group with students ready for examinations being able to arrange a date to suit, with the venue being local high or technical schools, or such, arranged by the groups, and a non- amateur supervisor from the local community.

The time could be evenings or Saturday afternoons. The only participation required from the Department would be the provision of sealed examination papers, marking of the answer sheets and distribution of the results.

This system would increase flexibility and provide better service to the new recruits. Hopefully, it would also help to avoid further increases in examination fees, and also reduce the pressure on both candidates and instructors.

The CW examinations is of course more of a problem, but it should be possible to use tape recorders both ways!

Alternatively, there could be accreditation of reputable operators as CW examiners.

IS THIS PROPOSAL FEASIBLE?

Would amateurs be prepared to assist in making the arrangements, especially in rural areas? Can the system work for the few lone candidates in areas without active amateurs?

Another suggestion is that the WIA become the accredited examining body, to take complete control of all examinations, with DOC simply providing certificates on presentation of a WIA statement.

THINK AND TELL!

Please let me have you ideas on these proposals. Tell me all the problems you foresee — and the solutions, if possible.

It will, of course, be some time before such changes can be adopted if they are to be. For the present, one of the major complaints I receive from class instructors is the lack of access to the actual examination papers. We have been negotiating with DOC about this, and it has been agreed that an Institute representative should have the opportunity to read the papers, either on the day of the examination or within a day or so afterwards.

Arrangements should be made in advance with the local State Office of DOC, and any comment or criticism should go formally through the Institute.

At the time of writing these notes, we have not had this as a formal policy statement, and it may not have reached all State Offices yet. But it is probably worthwhile for Divisions or groups with local examination centres to inquire about the possibilities. In the larger centres, I would expect the groups running the classes to arrange between themselves who would be the representative for a particular examination. In this way, we would be able to keep more check on papers, I would receive useful comments and instructors would no longer have to rely on the memories of the candidates for feedback on their courses.

I look forward to hearing from you!

73 Brenda VK3KT

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AR86

Electro-Magnetic Compatibility Report

Hans Ruckert VK2AOU
EMC REPORTER
25 Berrille Road, Beverly Hills, NSW. 2209

Amateur Radio and *E*lectro- *M*agnetic *C*ompatibility

It has been over a year since we had a regular EMC column in AR. While Tony Tregale VK3QQ, was in the position of EMC Co-ordinator, his monthly column frequently included material supplied by Hans Ruckert VK2AOU. We now have pleasure in introducing Hans as a regular columnist. Although he is not in a position to take over fully the job of EMC Co-ordinator, he will keep us up-to-date with developments in this area, particularly those reported from West Germany, where progress in establishing EMC standards is well advanced. — Ed.

Recent events have shown that we still have a long way to go before EMC legislation here and overseas protects the radio amateurs' right to use transmitters as specified by the licence and regulations, in spite of some common law interpretations to the contrary.

To meet the desire of Executive to continue the EMC column in *Amateur Radio* this writer intends to carry on some of the work done in the past by VK3QQ. Proposals are:

1. A series of papers for AR on EMC will be prepared, which may be used by radio amateurs to defend their right to transmit. It is suggested that WIA members keep these papers. Copies if necessary can be given to:
- Complaining neighbours
- Service departments of electronic entertainment equipment firms
- Radio Inspectors
- Solicitors acting for or against radio amateurs
- And to other members of the legal profession.

The papers will be a source of information on the background and technology of EMC. Members may keep these papers in a folder as *Amateur Radio EMC Defence Kit*. It should be possible for interference cases to be resolved peacefully, avoiding costly and anti-amateur court cases. The papers will explain to all parties involved why government action (Communications Act, section on EMC Immunity Standards) is necessary for the co-existence of all users of the radio frequency spectrum.

2. The most effective demonstration, that a legally operated transmitter does not interfere with correctly designed electronic appliances, can be made, if we put our house in order. To achieve this we must avoid the purchase of appliances which are not immune to a reasonable degree or cannot be made immune to unwanted but legal transmissions on totally different frequencies. With sufficient support we could compile a register of appliances (television, broadcast, video recorder, etc) which are affected by legal transmissions, to warn others who intend to purchase these appliances. The same goes for appliances (computers, television sets, etc) which cause interference to our receivers on amateur frequency bands. If sufficient information can be obtained several organisations may be interested — dealers, manufacturers, DOC, consumer associations, the Department of Consumer Affairs.

3. Reports on successful cases where appliance service departments and radio inspectors (local or overseas) have overcome EMC problems. Members — please let me know.

4. Details of EMC standards and testing methods developed in West Germany, to be passed on to the ITU, DOC Australia and involved organisations.

5. How radio inspectors and the Post Office (FTZ — DOC) in West Germany deal with EMC collision cases.

6. High-pass, low-pass and line-filters — what they can and what they can't do. Ferrite suppressors.

7. Video Recorder (VCR) EMC problems (by DL1BU, honorary technical officer of the DARC).

8. VCR-EMC Standards (by DL9TJ, EMC specialist of the Ministry of Science and Technology).

9. Reported court cases, where the blame was placed where it logically belongs (precedents for future decisions).

It is not the fault of the radio amateur service, that immunity standards already introduced or contemplated in some countries were not in force 50 years ago for broadcast sets and 25 years ago for television sets. This would have protected the unaware non-technical public from purchasing appliances which are incompatible with other services (not only amateur radio). This is a problem of our technological times. Party politics and economics have nothing to do with it nor can they help. Australia is not "a different country," as far as EMC of services and appliances are concerned. Some conscientious overseas manufacturers have already achieved EMC immunity levels (TV-VCR, etc) considerably better than the now legal requirement of three volts/metre in a field strength test-cell.

It has even been found that by selecting the correct earthing points on the chassis (if there is one), the number of components and the production cost could be reduced. By such measures the chassis becomes "cold" for RF, enabling shielding to be effective, as many radio amateurs have known for years.

In spite of these long overdue achievements there are millions of appliances in service, either locally manufactured, imported by dealers or brought in by travellers prior to the adoption of immunity standards. Such devices cause the public and the transmitting services a great deal of trouble, and produce frustration among radio inspectors and radio amateurs.

EMC REGISTER

The purchase of equipment or appliances, which cause EMC problems is not in the interest of the Amateur Radio Service nor of the public. If you wish to support this program, cut out or photocopy this part of the page, fill in your particulars, and post to H F Ruckert, 25 Berrille Road, Beverly Hills, NSW. 2209.

EMC Register — Receiver Interference
Which electric/electronic equipment of your own and/or of your neighbours causes interference to your shortwave reception due to excessive (perhaps illegal) radiation?

Type	Make	Model	Frequencies Affected

EMC Register — Transmitter Effects
Which electronic/electric equipment of your own and/or of your neighbours is affected by your legally operated transmitter most likely due to lack of immunity/selectivity of the appliance?

Type	Make	Model	Affecting Transmitter Frequencies

Australian Ladies Amateur Radio Association

Joy Collis VK2EBX
PUBLICITY OFFICER, ALARA
Box 22, Yeoval, NSW, 2868

With the ALARA Contest fast approaching, I thought it would be a good idea to start getting a little CW practice in, only to discover, when I located my key, several centimetres of dust and a little cobweb! A rather sad confirmation of the fact that I do not use it often enough.

I suppose many of us, on attaining the dizzy heights of the full call after much time and effort, do tend to consign our faithful CW key to a remote corner of the shack, knowing that examination is behind us and there is no longer a compelling need to keep up the practice. We tend to forget that there is a whole new "CW World" out there for us to conquer.

Back to the novice YLs and the ALARA Contest, and of course, the Mrs Florence McKenzie CW Trophy, to be awarded to the novice YL with the highest CW score. (Not necessarily an ALARA member). The minimum score is 50 points, and when you consider that CW contact points are doubled, you have only to contact five ALARA members on CW to be "in the running." Don't be put off by the fact that many of the girls are full call members. They will be more than happy to adjust their speed to yours. Last year, many OMs also were looking for CW ALARA contacts, and no doubt this year will be the same. How about giving yourself a chance to win this unique award?

While on the subject of the ALARA Contest, we would like to thank Ian VK5QX, the Federal Contest Manager, for publicising the event, in June AR. However Ian, these days we do a lot more than just assist the OMs and provide food, etc. (See ALARA Column, August AR).

ACTIVITIES

Activities held in connection with our 11th birthday included:

VK5 Get-together Luncheon on July 20.
VK3 Get-together Luncheon on July 27.
Birthday Activity Day on July 26.

The AGM was held on August 26, with a few changes to the Committee.

The Office Bearers are:

Marilyn Syme VK3DMS	President
Jennifer Warrington VK5ANW	Secretary/Vice President
Val Rickaby VK4VR	Treasurer/Souvenir Custodian
Margaret Schwerin VK4AOE	Vice-President
Mavis Stafford VK3KS	Award Custodian/ Historian
Marlene Perry VK2KFQ	Contest Manager
Meg Box VK5AOV	Minute Secretary
Bron Brown VK3DYF	Editor
Bev Hebiton VK6DE	Librarian
Jessie Buchanan VK3VAN	Sponsorship Secretary
Joy Collis VK2EBX	Publicity Officer

State Representatives

Bobbie O'Hare VK2PXS	VK1 and VK2
Bron Brown VK3DYF	VK3
Margaret Schwerin VK4AOE	VK4
Meg Box VK5AOV	VK5 and VK8
Poppy Bradshaw VK6YF	VK6
Helene Dowd VK7HD	VK7

We would like to thank the retiring office bearers, in particular Helene VK7HD, Marlene VK5QO and Valda VK3DVT for their untiring efforts they put into ALARA's progress, and also wish the office bearers, old and new, a very successful year.

ALARA AWARD

Award number 119 was awarded to Alan G Hughes ZL3KR, on June 11, 1986. Alan's award was endorsed all 3.5 MHz SSB.

CORRECTIONS AND AMENDMENTS — Membership List, July AR

The following call signs were incorrect:
Jan VK2CJN, Chris VK4ABM, Cecily VK4QW, Shirley WD8MEV.

Omitted from the list were:
Kirsti VK9NL — joined June 1, 1980
Bobbie VK6MH — joined December 14, 1976
Peggy VK6NKU — joined February 15, 1983

Apologies for any inconvenience caused.

From left: Lori VK4FFQ, and Val VK4VR.

Alice Epperson KD7SH.

WIA 75 ANNIVERSARY MEDALLIONS

I have been notified of the award of two more medallions to ALARA members, which were omitted from the original list in June. They are Barbara VK3BYK, VK3 Inwards QSL Bureau; and Gwen VK3DYL, (and family).

Congratulations Barbara and Gwen. Sorry you were missed from the original list.

1986 YL CONTESTS

Howdy Days — September 3, 1400 UTC to September 5, 0200 UTC.
IX International Contest 1986 — September 27, 1300 UTC to September 28, 1300 UTC.
15th JLRS Party Contest —
Phone: September 27, 0300 UTC to September 28, 0300 UTC.
CW: October 4, 0300 UTC to October 5, 0300 UTC.
YL Anniversary Party (YLRL)
CW: October 15, 1400 UTC to October 17, 0200 UTC.
SSB: October 29, 1400 UTC to October 31, 0200 UTC.

That is all for now — see you next month.

73/33, Joy
ar

Remember the ALARA Contest on November 8, 1986

Dulcie Hornsby VK4BDH.

Magazine Review

Roy Hartkopf VK3AOH
34 Toolangi Road, Alphington, Vic. 3087

(G) General (C) Constructional (P) Practical without detailed constructional information (T) Theoretical (N) Of particular interest to the Novice (X) Computer Program

VHF COMMUNICATIONS, 4/1985 — Micro-Stripline Antennas (T). Micro-Stripline Formulas (T). Power Amplifiers (P). Transverter 144/1296 (P).

RADIO COMMUNICATION, June 1985 — 1985 Convention. Dual Conversion IF AF Strip (C). UHF/VHF Front End Design (T). Modifying Capacitors for Transmitting (P/N).

RADIO COMMUNICATION, May 1986 — RSGB News Bulletin (G).

CQ, March — Microphone Interface/Oscillator Unit (C). Antenna Length Chart (G). DC Speed/ Power Control (G).

RADIO COMMUNICATION, June 1986 — BLW96 Linear for 50 MHz (C).

CQ, April 1986 — Special Antenna Issue. Shortened Vertical for 20 and 30 metres (C). Loop Array for 160 metres.

73 MAGAZINE — W2NSD/1 Editorial (G). Amateur Behaviour (G). Loop Antennas (P/N) Universal Digital Frequency Display (P).

QST, April 1986 — Switched Capacitor Audio Filters (C). Coil Inductance Tester (C/N). Gravity Gradient Modulation (A/F). USA Spread Spectrum Rules (G). Great Armadillo Run. Broadband Antenna for 80/75 metres. 160metre Linear-Loaded Sloper. Tune-up a Tribander.

WORLDRADIO, April 1986 — Amateur Emergency Services (G). First QRP WAC Certificates (G). Packet Radio. General World Amateur News and Views.

SHORT WAVE MAGAZINE, March 1986 — 50th Year of Publication. 80 metre CW Transmitter. (C/N). Low Cost Linear using 813s (C). Infinitely Variable Polarisation Devices for OSCAR.

ar

Listening Around

Joe Baker VK2BJX
Box 2121, Mildura, Vic. 3500

Here it is, mid-July and freezing cold at Buronga as I write this column. It is probably the weather that has kept me away from the typewriter, but I would like to finish the story of Morotai, the beetle-shaped island in the Halmaheras, located at two degrees, 20 minutes north, 128 degrees, 25 minutes east.

Whilst on this island, the soldiers of World War Two were continually complaining of the incessant torrential rain, the high humidity, the bully- beef, powdered potatoes, chlorinated water, atebrin tablets and the anopheles mosquitoes (the ones that carry malaria — even though I never knew anyone who contracted malaria there due to the intense anti-malaria precautions that were taken by the Army).

I have already mentioned the war trials that were held on Morotai and the subsequent punishments carried out at locations which were top secret.

I have forgotton so many things that were part of our existence there, but occasionally I remember them and may write about them again from time-to- time. (Hopefully, I will not be guilty of writing about the same thing twice!).

DROPPING NAMES

There are some names that I still remember from those days, such as Major Cheong, who was editor of the army newspaper *Table Tops*, when first news of the end of the war was received. Then there was a Lieutenant Taylor, who merits a mention because he was Orderly "room" (hut) Officer, (it was his signature I got a mate to forge on the middle pages of my AAB83 paybook when I desired an extra 14 days leave on my return to Sydney).

When I later transferred to the Army Amenities Radio Station, 9AD, there was a Lieutenant Miller as OC of the station, Warrant-Officer Barnett, who was well-known to his 2CH Sydney pre-war listeners for his ability to play the organ. WO Barnett was one of our announcers and I believe in later years he became the organist at the *Regent Theatre*, in Adelaide. And there was Lionel Court from Western Australia, who was in charge of the technical-side of radio 9AD, and managed to get the station back on the air on the morning when I blew the main fuses and threw everything into confusion when the electric jug I was using short-circuited!

USING CHALK MARKS

Radio station 9AD was on 1440 kc (kHz) and operated with power of 200 watts which was generated by a pair of 20 kVA generators working alternate days. The generators also had to supply power for about 400 camp lights.

Pre-recorded shows, well-known to mainland listeners at that time, such as *Yes, what?*, the *Cashmere Bouquet Show, Pick a Box, Mrs 'Obbs, Dad and Dave,* etc were sent to the station on large discs. Some of these discs contained commercial advertisements which had to be edited out by WO Barnett in the record library prior to the disc going to air. He did this by listening to the disc the day before it was to go to air and placed white chalk marks on the place where the advertisement began and ended. When the program went to air, he merely had to lift the pick-up from one chalk mark to the next to delete the advertisements. (The army would not appreciate advertising material on its radio station in a war zone with the soldiers having nowhere to buy the products advertised — anyway, who wanted boot polish when no one polished their boots!).

DUMPING PROCESS

With the conclusion of the war in the Pacific, there was a lot of equipment on Morotai and nothing to do with it. I had travelled to Morotai on an American troop ship, the *Frederick C Ainsworth,* from Brisbane. I did not arrive back in Australia until many months after the end of the Pacific war on the *Kanimbla,* a Malcolm McEachern Line Passenger Vessel, which, with its maritime broadcasting station 9MI on board, was familiar to pre-war shortwave listeners on the 49 and 25 metre bands as the ship travelled around our coasts.

The equipment on Morotai was dumped as it would have occupied valuable space to bring it back to Australia. Things like staff cars and jeeps were dumped into the sea. Before we departed, a friend and I set up a business to repair radios (with scrounged parts) for the units who were bound for Kure and other places where the British Commonwealth Occupation Forces (BCOF) went to. After leaving Australia these troops were on Morotai for a time before moving on to Japan. There was a large aircraft dump on Morotai and my friend and I found this to be the location where we could get plenty of wire (wire was in short supply on Morotai). We would head off to the dump armed with side-cutters and pliers.

The dump was frequently partially filled with tropical rain, and we would check-out 40 or 50 planes, often walking on the wings of one plane to climb onto the fuselage of another in our scrounging. Unfortunately for us, the RAAF personnel who had fished these planes out of the sea had usually gone through them pretty thoroughly and all the valuable equipment had been removed by the time we arrived. All we could get was miles and miles of plastic-covered wire, which was the first of its type that we had seen.

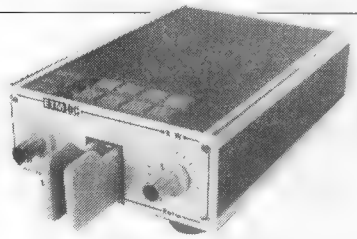
Other troops visited the dump and their main interest was Perspex, which was in great demand to make "souvenirs" to send to their home-folk, or to the American GIs. Souvenir Japanese swords were especially manufactured and *stained* to look like the genuine article. These were sold to the Americans for Dutch Guilders, the currency on Morotai. Also, the two bottles of beer that were received each week were also sold to the Americans for more Guilders and Cents than we had paid for them.

SOUVENIRS

The only relic I now have is a genuine Japanese Samaurai NCO Sword. I got it whilst I was at 9AD. After the end of the war, and in particular the surrender ceremony, when nine Japanese officers relinquished their swords to General Blamey, masses of swords, guns, etc were distributed to us on the island. This was when I acquired my sword. The only war-like duty it has performed in the intervening years has been to chisel open a locked door at my residence at Buronga. I did have other souvenirs of those days, including the famous issue of *Table Tops,* dated 15 August 1945, and an official photograph of many of us at the Surrender Ceremony, but they have vanished over the years.

Very soon I will write about the trip back to Australia and the things that happened to me in the post-war years in Sydney. Thanks to all who have complimented me on these articles on air, it is very much appreciated.

73, Joe VK2BJX



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CORDLESS TELEPHONE BUYERS WARNED OF ILLEGAL UNITS

A spokesman for the Department of Communications has warned buyers of cordless telephones to be on the lookout for illegal units, as the has been reports of unapproved units being imported and sold. These units can cause interference to other radio communications services including radio and television broadcasts.

Use of the unapproved telephone is an offence under the *Radiocommunications Act 1983.* Substantial penalties including confiscation of the equipment could be imposed.

All cordless telephones used in Australia require both Department of Communication and Telecom Australia approval and it should display approval numbers from both organisations along these lines:

Telecom Authorisation
No. C85/35/24

Department of Communications
No. DOC 302 0999
(or RFM E002 0999)

People who have unknowingly bought an unapproved cordless telephone can seek recompense from the supplier under Section 53 of the *Trade Practices Act 1974.*

Buyers unsure of the status of the cordless telephone should contact any business office of Telecom Australia or any office of DOC.

Club Corner

WESTERN AND NORTHERN SUBURBS ARC

The 7th Transport Squadron of the Army Reserve will be attending the monthly meeting on September 5, to present a view of a reservists life to members of the club and included in the night will be demonstrations of Army equipment.

On September 13, 1986 the Western and Northern Suburbs will be holding the annual *Hamfest,* between 10 am and 4.30 pm.

The October meeting will see an interesting talk about VHF/UHF Propagation using aircraft enhancement, presented by Doug McArthur VK3UM, a Technical Editor of *Amateur Radio* and an exponent of this form of propagation.

All visitors, friends and members are invited to attend these events. Visitors are made most welcome.

BALLARAT AMATEUR RADIO GROUP

On November 1 and 2, 1986, the Ballarat Amateur Radio Group will again be conducting a *Hamvention* at the Sebastapol Football Clubrooms.

Readers of *Amateur Radio* are cordially invited to take part in the activities which will be held over the weekend.

This years *Hamvention* will be different to previous years. The theme for the event will be Amateur Satellites with a guest speaker from interstate talking on the Saturday night.

A couple of new events, like a high speed CW receiving contest, will be part of the event.

Readers interested in taking part in the *Hamvention* are requested to complete the circular which will be an insert in a later AR, or contact the Group at Box 216E, Ballarat East, Vic. 3350.

Contributed by Murray Felstead VK3AAI

SWAN HILL DISTRICT RADIO CLUB

The two-metre repeater of the Swan Hill District Radio Club, VK3RSH, became operative in 1975. Originally it was decided to adopt the common receiver, transmitter, and antenna system with associated cavities, as described in ARRL publications.

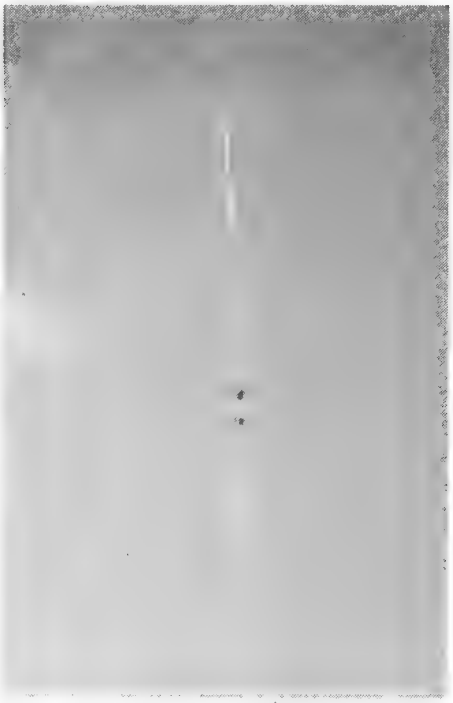
The electronics system was home-brewed, mainly from kits available at the time. The 146.900 MHz transmitter was capable of 25 watts output and the receiver was capable of good performance. However, receiver sensitivity was limited by an over present de-sensing problem caused by the inability of the cavities to provide adequate isolation.

VK3RSH was originally located at the home of VK3BM, within the city boundaries of Swan Hill. Even with an antenna height of 36 metres, mobile operating range was limited to about 25 kilometres, so in 1984, for various reasons, it was decided to relocate the repeater to a clear area, five kilometres from town, with the antenna elevation remaining similar to the original location. The collinear antenna was replaced by an omni-directional array of four phased folded dipoles.

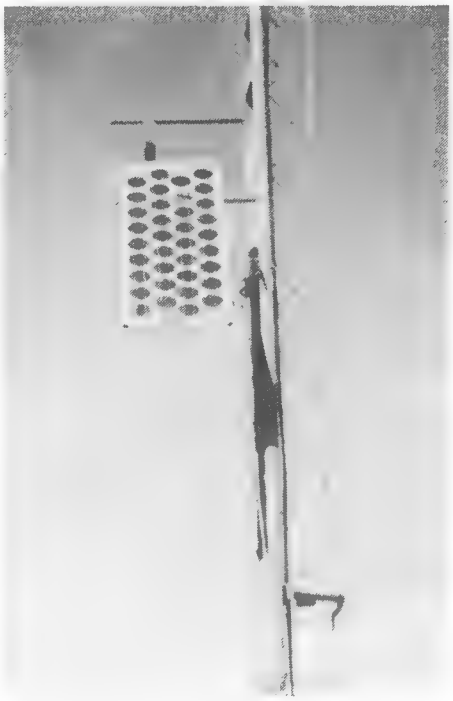
No AC power was available so a solar cell bank was installed. Two bunkers were constructed — one for batteries and the other housing the electronic equipment, plus the six cavities. The receiver signal-to-noise ratio was improved and the mute section was updated. But, it was all to no avail — receiver de-sensing.

Simplex tests were then carried out, using the repeater antenna system. Even with a disappointing SWR of 2.4:1, results indicated that the mobile range should exceed 40 kilometres.

The possibility of a dual vertical antenna system



The antenna set-up showing the discone under the G6144A.



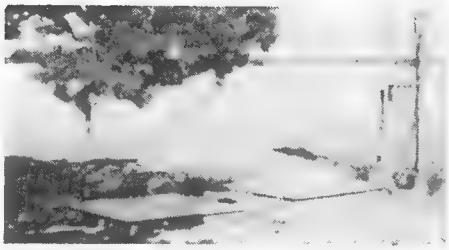
The solar panel mounted on the tower.

had previously been discussed and it was decided to do some experimental work on such a system. Results were encouraging.

The receiving antenna was mounted 1.5 wavelengths above the transmit antenna resulting in 48 dB of isolation. One conventional inductive notch cavity was installed in the receiver input and a shunt mode capacitive notch cavity was installed in the transmitter output. Power loss for the shunt cavity was .25 dB as against .8 dB for a series type.

The receive antenna has a gain figure quoted at 6 dB over a dipole. The transmit antenna is a modified discone with a probable gain of 1.5 dB.

A low SWR for both the receiver and transmitter antenna is essential to prevent coupling between associated coaxial cables. No special precautions



Bunkers in which the repeater and batteries are housed.

are then necessary regarding cable orientation except for the short length from the receive cavity to the receiver input.

The feature of this system is that the repeater has a slight receive function advantage, exactly the opposite situation existing with the common receive/transmit antenna previously in use. There is no receiver desensing.

As random noise output from the transmitter has no effect on receiver performance, an audio peak limiter is employed to maintain a satisfactory deviation index.

The undulating terrain of the Victorian Mallee and adjacent New South Wales Riverina has no high vantage points. Mobile tests now show a reliable omni- directional mobile range of 50 kilometres with better results under favourable conditions. Base stations at Robinvale, 125 kilometres distant, regularly access the repeater.

Installed solar cell performance is highly variable due to daily and seasonal fluctuations in light intensity. Absolute maximum charging rate is 2.4 amps. Under cloudy conditions, even in mid-summer, output can drop to a maximum of .75 amps. The receiver and control circuitry current consumption is .3 amps. Internal battery leakage is about .1 amp, so careful monitoring of the battery charge level will be necessary.

A new identification system, using CMOS technology, has been installed and perhaps a new receiver, with reduced power consumption should be considered.

Variations of the antenna system have yet to be researched and one that comes to mind is the use of the discone as the receiver antenna with a notch filter and RF pre-amplifier mounted under the cone for protection.

It is still too early to ascertain the stability of the two notch filters in their bunker environment. They are stored in a cabinet lined with greasy wool. Wool is still probably the best and most durable thermal insulating material available. One thing is certain, the 48 dB antenna separation is a constant factor.

The Swan Hill and District Radio Club hope that their two-metre repeater installation is now capable of stable operation and improved performance for the future.

The Major Mitchell Award, celebrating Swan Hill's 150th Anniversary, is available to those amateur stations which fulfill the necessary requirements, see page 42, April AR, and contacts via the repeater involving Swan Hill Club members are eligible for the Award.

Written by Doug Loft VK3ZOX and contributed by Jeff Baber VK3DUJ, Secretary, SHDRC

SWAN HILL DISTRICT RC

When the Swan Hill District Radio Club Repeater, VK3RSH, is now operational from its new location and the Club Repeater Officer, Doug VK3ZOX, presented a full report of its modifications to the AGM in early June.

Rex VK3OF, Immediate Past President, commended Doug and those involved with the repeater as well as those who were involved in Club activities during the past year.

Daryl VK3AMJ, takes over as President for 1986/87 and Jeff VK3DUJ, continues as Secretary.

Club meetings are held on the first Thursday of the month at the Swan Hill Technical School and visiting amateurs and SWLs are always welcome.

Contributed by Allen Fountain VK2YAH, Publicity Officer, SHDRC

HORNSBY AND DISTRICTS ARC

At the AGM of the Hornsby and Districts Amateur Radio Club on May 27, 1986, the following Committee Members were elected:

President and Education	Tony Lamacchia VK2BTL
Vice-President	David Ramsay VK2KLX
Secretary	David Priday VK2CDZ
Treasurer and QUA Editor	Trevor Smith VK2ECD
Publicity Officer	Colin Christie VK2PLV
Emergency Communications and Morse Machine	Barry White VK2AAB
Library and QSL	Ted Davies VK2ZED
Repeater	Gareth Davey VK2ANF
Council Liaison	Jeff Page VK2BQ
Club History Project	Keith Alder VK2AXN

Meetings are held on the fourth Tuesday of each month at the Asquith Sports Club Hall, Old Berowra Road, Hornsby.

Club Nets are held on Mondays, 1000 UTC, 28.370 MHz (sometimes on the alternative frequencies of 3.615 and 147.250 MHz), watch for VK2APF. All welcome to join in!

Information supplied by David Priday VK2CDZ, Secretary, HADARC

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DEVIL NEWS — from the North West

The last meeting of the Club saw 23 members and two visitors present, with apologies from VK7s KY, AR and OL. Guests were Barry VK7FR and Joe VK7JG. Joe was representing State Council, being Guest Speaker for the night.

During the course of the evening, Joe advised that instead of State Council paying for repeaters VK7RNW, VK7RAA, etc, each Branch will be responsible for their own local repeaters. This matter will be discussed further at the next State Meeting.

Noel VK7EG, requested the AGM month being changed and referred to the relevant constitution reference — this matter is now to go to State as a Request of Change.

Bruce, the Treasurer reported that the financial position was satisfactory.

Andrew is having success with repeater VK7RAD and has had it running on test at his QTH. It looks as though it will not be too long before it will be installed on the mountain top.

The new room at the High School is still progressing well and is becoming more homely with a donation of carpet from Don VK7DP and coffee mugs from Andrew VK7ZAP.

The News Co-ordinator requests to hear from people who are willing to do relays for him when the North West has news — please ring Arthur if you can help.

There was considerable discussion when Ron VK7RN suggested that the broadcasts were not as good since they had been taped.

Joe VK7JG, spoke about Federal News and advised that the Federal Office has opened a Bulletin Board using a computer modem and suitable program for receiving news.

He also spoke about examinations and the 1988 Federal Convention, which will be held in Canberra.

Thanks go to Greg VK7ZBT for his assistance with these notes. If any other branch members have any news please contact VK7KY, QTHR.

Contributed by Max Hardstaff VK7KY

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WAGGA AMATEUR RADIO CLUB

This year's Convention at Wagga Wagga will be held on the weekend, October 25 and 26, 1986.

The Annual Wagga Wagga Convention is the Club's premier event. Trade displays from Sydney and Melbourne will combine all the major equipment manufacturers — the trade displays always help the event to be such a success.

Last year, Icom donated a transceiver as a major prize.

Accommodation for this year's event will be detailed in October AR. Come along and enjoy yourself. Everyone welcome.

Contributed by Peter Clee VK2KZZ

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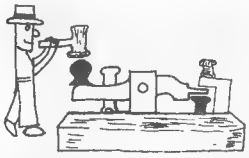
THOUGHT FOR THE MONTH

Tough times never last — but tough people do!



Pounding Brass

Marshall Emm VK5FN
Box 389, Adelaide, SA. 5001

Time certainly gets away from you doesn't it? These columns are serially numbered, so I can keep track of what gets printed, when, and although the serial number doesn't appear in print, it is staring at me from the screen as I write this. This is number 49, which means the column is now in its fifth year. Actually, in case anybody else is counting, it is in the second month of the fifth year because we somehow missed the deadline one month and everything got rolled over.

As usual, I have no trouble in finding things to write about — but have difficulty in working out where to start, so let us start with the good news.

The response to the suggestion that there should be a CW "Sprint" contest was overwhelming. Not just from fellow brass-pounders, but from phone operators who feel that if it is good enough for CW, it is good enough for phone. So . . .

As occasional (and current) President of the Adelaide Hills Amateur Radio Society Inc, it gives me great pleasure to announce that the Society will organise the inaugural "National CW Sprint" on Saturday, November 15, 1986. The CW Sprint will be followed on Saturday, November 22, 1986, by the inaugural "National Phone Sprint." It gives me equally great pleasure to announce that the Sprints have the endorsement of the South Australian Division of the WIA, which will provide trophies and certificates.

Ian VK5QX, assures me that the full rules will be published in his column in October, but don't worry — it is not complicated. The whole thing is designed according to the KISS Principle (Keep it Simple, Stupid). The Sprints will be nation-wide, for an all out hour and a half on Saturday night on 80 metres. One point per contact (no repeats), whether it be a fellow VK, a JA, a BY, or whatever. There will be an outright winner in each Sprint, and certificates for the top scorers in each call area. Certificates will also be awarded for "special merit" so if you want a real challenge, try QRP, or mobile.

Those of you who read *Pounding Brass* regularly will recall the reason for suggesting the CW Sprint was that the established contests are too long and have too few CW participants to be really enjoyable. An hour and a half should not be enough time to work all of the participating stations, so the emphasis will be on operating skills.

There might be some inclination for slower operators to feel disadvantaged — don't. I am sure that all participants, being gentlemen knights (and of course ladies) of the Key, will follow the Golden Rule of speed and slow down to work slower operators. Besides — what better incentive to get your speed up?

On another subject, I promised to report on the club's visit to the OTC Coastal Radio Station, at McClaren Vale (Adelaide Radio, for SWLs). Well, I am going to beg off for another month because the manager of the station, Fred VK5YK, is coming to speak to the club in a couple of weeks and I want to check some facts and figures with him. It was a real eye-opener, especially to see the transmitter room. But more about that next month.

You may recall discussion of the K P Thomas Automorse Mechanical Key in this column in recent months. Well, at the last WIA Buy and Sell I became the proud owner of one. It is a weighty beast — about two kilograms — and quite complex. At a guess it would have around 100 actual parts, and there are 20 screws provided for adjustment. There are three paddles; automatic dots, automatic dashes, and manual dashes.

When I first got the Automorse it was in a pretty sad shape. It was dirty, and would not do anything except "clank" when I picked it up. Given the number of parts, it was a fairly long and drawn-out process to disassemble, clean and reassemble it, but it was worth it. It responded well to a bit of *Brasso,* but some sort of dip cleaner would have been a lot easier. Unfortunately, I don't know what the metal is. It looks a bit like what we used to call "German Silver" or nickel-plated brass. It does tarnish, but it is not silver. The colour is a bit warmer than chrome.

Anyhow, it looks a treat now! So good that I have decided to build a museum-case for it. Of course, appearance is not the only reason it belongs in a museum case . . .

Adjusting the Automorse is not as difficult as I was afraid it might be, given the number of adjustments, because after all, the basic principle is quite simple. The paddle releases a spring pendulum and the speed of oscillation is a function of the length of the arm and the weight at the end of it. The dot lever carries three sliding weights, and the dash lever has two. In addition to the position of the weights, you can adjust the spacing between the contacts, the position of resting and limiting stops, and the tension on the paddle.

Once it is going (about three hours' work hooked up to a keyer) it is simply a matter of matching the timing and weighting of the dots and dashes. Having done that, and bearing in mind that the *slowest* speed possible appears to be around 18 WPM, *it is not something that can be changed quickly on air.*

Since I am used to a Bencher paddle, I find the Automorse pretty crude in terms of effort required to generate a couple of dits and dahs, but I have played with it enough to see that one can get used to it, and it certainly represents an improvement over a manual key at high speed. Using any keying device is a matter of forming new habits. I note for example, that it took me a long time to start using the iambic keyer in its iambic mode, and the final technique is something of a combination. Perhaps it is a matter of practice, and/or adjustment, but I find the auto-dash facility on the Automorse is only useful for sending two or more dashes in a row (single dashes sent with the manual dash paddle).

Neville VK7NC, is another amateur who likes playing with keys. His efforts are more to the constructional side, and he asked for some assistance with building a paddle on the Bencher design. The Bencher was due for cleaning and adjustment, so I pulled it down and cleaned it, and photographed it in various stages of reassembly for Neville, who should be well on the way to having a new paddle by now. As I have said in this column before, the Bencher is an intriguing bit of engineering, and I might print the photographs in the column some time if anybody is interested.

That seems to have pretty well filled the space for this month. Don't forget about the Sprint — get in some practice while you can because I think that trophy would look great on ***my*** shelf!

ar

QSP

CB VIOLENCE

An 11-metre CB transceiver in La Habra, California, has been shot to death by an armed intruder.

Dennis Carrico was talking on his CB set after midnight when he sensed he was no longer alone. Carrico turned and saw a stranger with a gun standing over him. The gunman ordered him to turn off the CB and move away from it. Carrico obeyed, after which the visitor shot it three times and quietly left.

Carrico was not harmed but his transceiver was destroyed. Police theorise that the attack was in retaliation for TVI.

From *The ARRL Letter,* July 7, 1986

A R Showcase

TEGA ELECTRONICS

Recently in Melbourne, two soon-to-be ex-servicemen, found that there existed a need for a repair facility to cater for users of communication equipment and test equipment.

The two principals, Terry Collins and Gary Townsend, have between them, almost 40 years experience in the Military Communications and Radar field.

Terry has extensive experience with Satellite Earth Stations, being trained in the USA and subsequently being responsible for the repair and maintenance of a major Earth Station. More recently, he was responsible for the repair of Military Communication Equipment in south-east Australia by civilian firms.

Gary has taught electronics to apprentices for almost eight years and recently, for the past five years, has been responsible for the repair, maintenance and calibration of test equipment in south-east Australia. A very active amateur, Gary has an extensive VHF, UHF, and microwave station and is keenly interested in long-haul communications.

The new business is located in Montmorency, and will be able to provide the "personal touch", so often missing these days. An extensive range of test equipment is on hand to provide the best back-up possible. Most types of communication equipment can be maintained without the need to send your "pride and joy" interstate for service.

Call in and see Terry and Gary at 75 Grand Boulevard, Montmorency, Vic. 3094.

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IPS TRAINING COURSES

For those amateurs interested, IPS are running training courses on a one day basis. The course consists of three lectures covering various subjects. Generally the course is aimed at HF communications, but the presentation can be tailored to suit the audience.

Courses are normally conducted from 9.00 am to 3.00 pm and are presented in Sydney during September each year.

Cost of the course is $55 and further information may be obtained from PO Box 702, Darlinghurst, NSW. 2010 or phone (02) 269 8555.

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FREQUENCY MEASUREMENT

Associated Calibration Laboratories Pty Ltd, recently obtained certification as National Association of Testing Authorities (NATA) approved laboratory for frequency measurement. This is in addition to their current NATA certification in various areas of acoustic calibrations and surveys.

A unique feature of the reference frequency system is that it is phase locked to Omega VLF transmissions which have an accuracy of one part in 10^{12}.

Allowing for measurement uncertainties, the laboratory can certify frequency standards to better than two parts in 10^{10} and can measure non-standard frequencies from 10 Hz to 1 GHz. Apart from frequency standards, the laboratory can certify frequency counters, time interval meters and the frequency characteristics of signal sources.

By using Omega or North West Cape transmissions as a reference makes it much easier to verify the day to day accuracy of the laboratories frequency standards. The superior long-term stabilities and requirements of the frequency controlling elements in these VLF stations leaves little room for error when making comparative measurements. Even laboratories with rhubidium standards still have to verify them, from time to time, that their standard is within specifications.

Associated Calibration Laboratories is currently extending its testing/measuring facilities in other areas of RF measurement. The laboratory is situated at 27 Rosella Street, Doncaster East, Vic, 3109. Phone (03) 842 8822.

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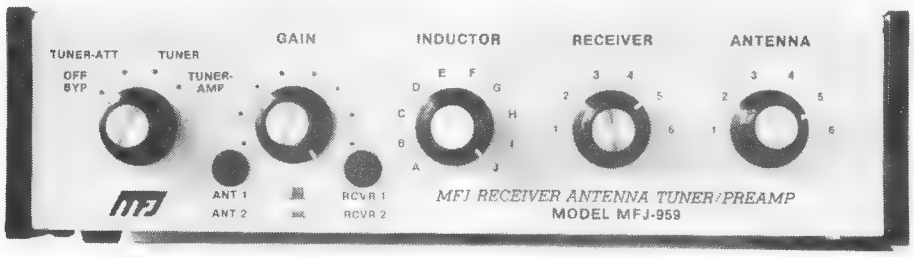

ACTIVE ANTENNA MATCHER FOR SWLs

The MFJ-959, made by MFJ Enterprises of Mississippi, USA, and distributed by GFS Electronic Imports, is designed to meet the needs of SWLs.

It incorporates an antenna matching unit which covers 1.8 to 30 MHz, a 20 dB adjustable gain preamplifier and two two-position coaxial switches, plus a mode selector.

Most shortwave listeners are faced with the problem of not being able to physically accommodate an antenna for each band they are interested in listening to. Alternatively, it is difficult to obtain a suitable broadband antenna which performs adequately.

With the MFJ-959, an SWL can now use a single random length of wire, which may be of any length that best suits the SWL's real estate, and still obtain dipole-plus performance over all shortwave bands. Users have reported up to seven S-points improvement over using just wire on its own.

The MFJ-959 can provide this performance because it electrically matches the antenna to 50 ohms, at the frequency of operation, then introduces 20 dB of gain at 50 ohms to the receiver.

Other facilities on the unit are the twin coaxial switches, designed to allow the user to select between two different positions. It also incorporates an additional front panel coaxial switch which allows the 959 to be by-passed completely, the tuner or matcher section only to be used, the matcher used with the preamplifier and, if necessary, 20 dB of attenuation to be inserted. Power requirements are nine to 18 volts DC. All input and output connectors are rear panel mounted and duplicated in both SO-239s or RCA types.

The price of the MFJ-959 is 388 plus $18 freight. There is also a nine volt AC adaptor which can be used to power the unit for $35.

For further information please contact GFS Electronics, 17 McKeon Road, Mitcham, Vic. 3132. Phone: (03) 873 3777.

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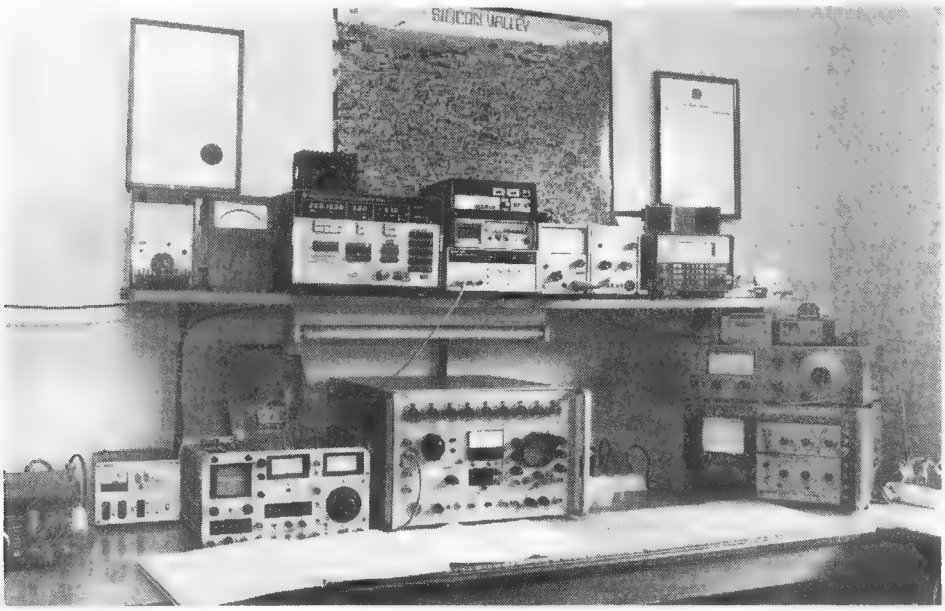


QSP

MURPHY'S COMPONENT LAW

All electronic components are filled with smoke — when it gets out the component is no good.

JINDALEE EXPANSION SUGGESTED

The Dibb Report on Australia's Defence Force capabilities calls for two more Over the Horizon Jindalee Radars.

The first such radar is undergoing operational trials near Alice Springs. Two more should be operational by the early 1990s and five such radars could possibly be justified to provide a more comprehensive surveillance cover.

DIGITISED METEOR SCATTER

A United States defence contractor has developed a system which combines digitised speech and meteor scatter. It claims the system could work even after a nuclear weapons exchange disrupted normal communications which relied on ionospheric propagation, and is immune to jamming or interception.

A demonstration showed the ability to send a one-way voice signal beyond the horizon by refracting the signal off ionised meteor trails.

Meteor scatter communication was first explored in the 1950s for non-voice data transmissions.

As many as 200 million meteors hit the Earth's atmosphere every day leaving ionised trails usually lasting between a few hundred milliseconds and two seconds.

The experiment used greatly compressed digitised voice signals in bursts, and the voice was synthesised at the receiving end using a computer.

VK2 Mini-Bulletin

Tim Mills VK2ZTM
VK2 MINI BULLETIN EDITOR
Box 1066, Parramatta, NSW. 2150

COMING EVENTS

The next Divisional Seminar will be held on Saturday, September 13, at Amateur Radio House. Starting time will be 10 am. There are four speakers.

The Divisional Broadcasts will have further details.

Following the success of the Anniversary Dinner there will be another one held on Saturday, October 11, at last years venue. Bookings should be made through the Divisional Office. Office hours are from 11 am to 2 pm weekdays, phone (02) 689 2417.

A reminder that JOTA weekend is October 18 and 19.

The South-West Zone Field Day weekend is scheduled to be held towards the end of October in the Wagga region. More details closer to the event.

Forthcoming WICEN exercises include the Batemans Bay Car Rally on the South Coast over the weekend of September 27/28. The Outward Bound Canoe Classic will be held again this year on the Hawkesbury River during the weekend of October 18/19.

DISPOSAL ITEMS

A new list of surplus items available for purchase from the Divisional Office may be obtained if you send a SAE.

The Divisional Council receives requests from time to time to assist in the disposal of radio items in a deceased amateur's estate. What often happens is that those having to dispose of the equipment have little or no radio knowledge. Recently, the Division received a request to assist with two estates and Council has decided to list the equipment in the *Hamads* if this magazine and to ask those interested to indicate their interest by submitting tenders for same. The replies are to come back via the Divisional Office, where they will be co-ordinated and returned to the families for their consideration.

REMEMBRANCE DAY LOG

Have you sent your log in yet? It must be in Adelaide before September 26. See page 29, July AR.

CLUBS

The next conference is to be held on Sunday, November 2. Your agenda items close by September 12, at the Divisional Office. Do you still have to respond to the information on insurance? If so, please acknowledge and return your comments.

REPEATER NOTES

Oxley Region ARC is to establish a Packet (7575) Repeater and a UHF system (8525) at their VK2RPM site.

The Central Coast ARC also wish to establish a Packet Repeater and an Amateur Television system for their region.

PLEASANT FIRST SUNDAYS

Well, it is Spring and if you live in Sydney or nearby, why not set aside the first Sunday of the month for a barbeque at VK2WI? September 7, and October 5, are the next two days.

If you have not seen the Divisional station, why not pay a visit any Sunday morning between 10.30 and noon.

A new Broadcast Roster is to be prepared for the remainder of the year. If you would like to assist please advise. In particular, we need full call operators for the Sunday evenings. The larger the team the less frequent you will need to attend. Contact Dave VK2KFU, the Broadcast Officer, via Dural or the Parramatta office.

NEW MEMBERS

As welcome is extended to the following new members who were admitted during July.

N K Little, Assoc	Crows Nest
P Maynard, Assoc	Merrylands
P A Pokorny VK2CPP	Blaxland
J Richardson VK2NET	Glenbrook
R Schreiner VK2NSR	Fairfield
G J Smith VK2KSG	Merewether Heights
F G Stoddart, Assoc	Lambton North
M W Willing	Castle Hill
K J Witchard VK2PKW	South Kempsey

ar

Five-Eighth Wave

Jennifer Warrington VK5ANW
59 Albert Street, Clarence Gardens, SA. 5039

The Jubilee 150 Committee have been delighted with the number of applications for the J-150 Award. After all, it is no use having an award if no one achieves it, however, this has created a problem with the publishing of the list of achievers, we are getting so many each month that they are taking up most of this column, so to ease the situation it has been decided to publish only the first certificate awarded to each person, in future.

This includes those gained under the VI prefix (unless it is the first certificate with any call sign). For those who did it the hard way (under the original rules), or those who still want to do it that way, there is a very nice endorsement "seal" available. Here are the latest 'first- timers'.

214	VK3DVT	270	VK3DMH	315	VK6ASM
217	VK3KAV	272	L40074	318	VK3BLB
218	VK5ABN	273	ZL2-259	321	ZS5GV
221	VK5APB	276	VK7NCH	322	VK6AJZ
224	VK5NDH	278	VK3NIR	324	VK5NRB
228	VK5NVC	281	9M2DF	327	VK5NVW
229	N6JFG	282	N7HHW	328	VK5NTK
232	VK8AV	283	WA6PEZ	329	VK2XV
235	VK4VJO	284	3D2DW	330	VK4KJD
238	VK5KEM	287	VK3XKG (as SWL)	332	VK3KKD
240	W6SIV	288	WA6YTV	333	VK2ELE
241	VK5PXK	290	VK2GA	334	VK4BKW
242	VK5BRS	291	VK2FIE	336	KA6KKN
243	VK5FS	292	N7HMB	337	N6MVW
245	VK3DSC	293	K0PGU	338	SM6OOI
247	VK5TP	294	N7BRL	340	N6BUI
250	WB7QBM	295	KD0JL	341	VK2EQY
251	VK5PRM	296	HB9DAY/W4	342	VK6AMB
254	VK2CJH	297	KA7YXC	345	VK5ZJ
256	VK3CNF	298	N5ITG	346	ZL2AVA
257	VK5BY	299	VK6ED	347	VK7NAX
258	ZL2ARF	300	VK3AUM	348	VK2DEW
260	W6KNP/5	301	ZS1FW	349	VK5BHP
262	VK4NNP	302	VK5PEM		
264	VK6OQ	312	VK5UW		

SADLY MISSED

When Chris Whitehorn VK5PN, told me of the passing of Peter Barlow VK5NPC, over the phone, I was very glad that he had prefaced it with 'are you sitting down?' Chris, with his usual forethought had realised that the news would come as a shock to me, as he had heard me giving Peter a segment for the Broadcast only hours earlier, and wanted to tell me personally before I heard it over the air, for which I was grateful. By the time Chris had contacted me it had already been arranged that Graham VK5AGR, would collect the broadcast gear from Peter's home and that Chris would edit the broadcast to spare those who knew, the pain of hearing Peter's voice or references to him. Thank you to you both, and to Bill VK5AWM, who agreed to act as Courier, for the magnificent way in which you stepped into the breach.

I sincerely hope that as you are reading this, my next remarks will be quite unnecessary, but as I write it we are in urgent need of a new Broadcast Producer. Chris offered to take it on until someone else could be found, but Chris is also involved in other things, and does not want it to be for too long a period. It we do not already have someone permanent, please give it some serious thought. Chris has already offered to give all the assistance he can. If, on the other hand, we already have a volunteer but you would still like to help in some way, we are looking for relay operators on several bands, in particular, the two and 10 metre bands. Either way, Chris or I would love to hear from you.

DIARY DATES

Tuesday, September 23 — Display of Members Home Brew Equipment.
(Don't forget that there are prizes and certificates awarded for the best entries, so bring your home-brew gear along, it might be worth your while!).

ar

VK3 WIA Notes

NEW MEMBERS

The following are welcomed as members to the Victorian Division.
Brian Anderson, Margaret Baxter VK3VOJ, Kevin Hartnett VK2FUO, Peter Hercelinskyj, Samitha Jayasinghe, Grahame Kermonde, Lloyd Kermonde, Alfred Taylor, and Leslie Warren VK3BPW.

ar

QSP

WIA MEMBERSHIP STATISTICS

As at June 30, 1986, the Wireless Institute of Australia had 8225 financial members. Of these, 163 are Associates, 1047 pensioners, 136 families, 101 students and 53 life members.

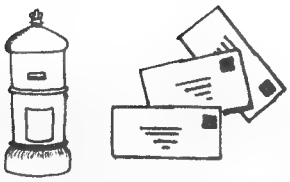
There have been 319 people who have not renewed their membership for 1986. ***Why?*** The WIA is concerned and would like to know the reasons why members do not renew.

Offset against this loss has been the recruitment of 338 new members. Not a very spectacular growth rate. When talking with fellow Australian amateurs discuss the Institute, find out if they are members, or would like to become members. If the latter, please pass the information on to your Division or the Federal Office and application forms and information on the WIA will be sent.

Many amateurs out there are just waiting to be asked to join the WIA, as they themselves are unsure how to go about it. You can assist them and yourself as well, as the greater the membership, the greater the spread of the financial burden.

Also, if other amateurs have constructive criticism of the WIA we would like to know. The WIA is not perfect, but it officers try very hard and it is only from feedback from the members that they can be sure that they are truly representing your point of view.

Remember, the WIA only exists for radio amateurs and because of amateur radio. ***It can only be what you make it!***



Over to You!

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publisher.

MINT CONDITION

I would like to take this opportunity to thank the people involved for the speedier delivery of *Amateur Radio* magazine to members like myself in country areas.

The introduction of the plastic envelope ensures that the magazine always arrives in mint condition.

Thanks once again, cheers and 73.

Ian Haworth VK6IH,
792 Andover Way,
Karratha, WA. 6714.
ar

INSIDE A SEALED PLASTIC BAG

In Tasmania fell the first snow of this winter. Mount Wellington, the backdrop of Hobart, glitters with snow.

To tell you this is not the purpose of my letter. Recently, I received the latest issue of the magazine *Amateur Radio.* It was inside a sealed plastic bag with a stunning blue imprint. It is an excellent idea. The magazine stays dry in rainy weather, and it remains clean. The clear plastic cover is good publicity for the *Wireless Institute of Australia,* and it lets the public have a glimpse of a wonderful magazine.

Congratulations.

I remain with many kind regards,

Bill Perieberg L70043,
Sunrise Garden,
Fern Tree, Tas. 7101.
ar

CONTACT PLEASE

We are interested in corresponding with one or two amateurs who are interested in two metres VHF, with particular interest in DX; eg Sporadic E, meteor scatter, aurora, etc.

We have both been licensed since August 1983, and we have spent many long days (and nights) monitoring for DX. We enjoy the challenge of working long distances on VHF.

One day, when monitoring the band for Sporadic E we were discussing the theory behind this mode of propagation. After reading one or two articles on the subject, it occurred to us that all the information we had available was centred around Western Europe. It was this realisation which brought about this letter.

We are intrigued to know about Aurora Australis and learn how it compares to Aurora Borealis.

We would be most happy to send information about VHF in the Northern Hemisphere in exchange for Southern Hemisphere information, possibly on a penfriend type relationship.

Your faithfully,

Linda and Phil Stubbs G6WYY and G6WYZ,
28 Permayne,
New Bradwell,
Milton Keynes,
MK13 0DG,
England.
ar

The following letter was written to the NZART magazine *Break In* in response to recent correspondence. Since Ian is referring just as much to the WIA as the NZART in his comments, it is appropriate that it should also be published in *Amateur Radio.* —Ed.

FURTHER THE CAUSE OF AMATEUR RADIO

I have read with interest the comments by correspondents in your magazine regarding the *DXpedition Paper* presented at the IARU Region 3 Conference, particularly those from ZL1s CN and AMN.

It is interesting to see discussion developed and to read considered comment by amateur radio operators. I feel that open discussion of many aspects of amateur radio in this manner is always of benefit.

I was however rather perturbed to read a letter published in a commercial amateur radio magazine here in Australia written by an ex-member of your association, namely ZL4MB. In his letter, Mr Andrews criticises variously both the NZART and the WIA.

Might I please point out to Mr Andrews, and to any others who may be of like mind, that both NZART and the WIA exist to further the cause of amateur radio on both a national and international basis. In doing so, they are also of benefit to both members and non-members alike.

Without strong representation to government and in international forums by such national organisations (and this includes overseas bodies such as ARRL, RSGB, JARL, DARC and a host of other national societies) the situation of amateur radio operators world-wide would indeed be much worse than it is. These organisations also join together through the IARU to co-ordinate many aspects of amateur radio for the betterment of the hobby.

The WIA certainly cannot claim to represent *all* amateur radio operators and I doubt that NZART does either. It is a fact, however, that the WIA is the only organisation officially acknowledged by the Australian Government as representing our fraternity. Furthermore, back in 1910, the WIA came into being as a result of a request from the Post Master General for an organisation to be formed to represent the interests of the amateur radio operators of that day, to the government.

Since then, the Australian Government has readily referred to the WIA for advice and representation in amateur radio matters. An official arrangement exists whereby this representation continues. I would assume that the NZART is in a similar situation.

Let those who wish to, stay outside the national bodies. There is no compulsion on them to join. However, those who are truly interested in the good of amateur radio would surely wish to be represented by joining their own national organisation. In this manner they can do their bit to advance the causes of the hobby by voting, expressing their opinions and exerting their influence in such a manner as to put right any wrongs where they may exist, or see that the correct path continues to be followed where such is already the course.

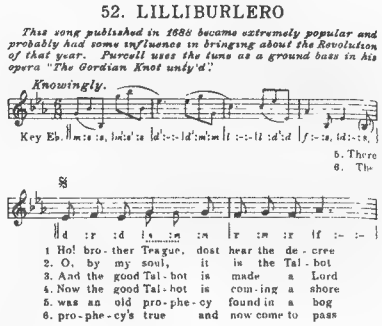
Let those who are not within the membership of the various organisations accept their situation whilst realising that they are not in a moral position where they can blithely criticise the actions and functions of a body to which they do not belong. This is a fact which many such persons do not seem to be willing to face.

Incidentally, I would not expect that the relatively short period of four months as a branch councillor would qualify Mr Andrews, or anyone else for that matter, as an expert on the affairs of the NZART.

This letter represents my personal opinion and should not be construed as voicing the official position of the WIA.

Yours sincerely,

Ian Hunt VK5QX,
8 Dexter Drive,
Salisbury, SA. 5109.
ar



FUTURE SHOCK?

The contribution by Alan VK4SS, in the July AR, *Prophecy from the Past* (p 20), was fascinating to read — and as I read it, my flesh began to creep and the hairs on the back of my head (about all that is left now — the top is desert) began to rise as a static charge of horror built up on my person. The word "uncanny" is hackneyed, but it perfectly describes this prophecy.

We are now halfway in time to 2036, and the prophecy is more than half fulfilled. We have the black boxes, the push-buttons, the printouts, and the equipment which is too complicated for the operator to fix if it goes wrong. Even the "1000 kW" of ERP is not so fanciful with maximum power driving a high gain array. As Alan says, "sealed" equipment has been proposed — it was a reality in Australia in 1923.

Even the concealed antenna system may come to pass; amateurs all over the world are fighting for their existence against local-government bureaucrats who must needs flaunt their brief authority by refusing permission to put up towers, unethically using thousands of dollars of ratepayers' money (as in VK5 recently) to fight us in the courts when we dared to question their right to ban a reasonable structure. The horrifying story from VK6 (p 59) speaks for itself.

Another straw in the wind on p 49 is *Morse Code Man.* Mr Jack Sykes is "believed to be the only remaining British manufacturer of Morse keys." Well, I've got mine safely stored against the day when I can drop the Z from my call, and it's a solid, pre-war one (WWI, not WWII) so it should see me out.

From out own resources, what about putting into effect the excellent suggestion of Robert VK3XZ (p 62), to *Preserve Amateur Techniques*?

And another. In *Intruder Watch* (p 43) Bill refers to jamming and such intruders as Radio Tirana. These problems have increased in recent years and will continue as irresponsible banana republics proliferate, and dictatorships become more powerful and immune to pressure from responsible nations. We can't do much about it except keep up the good work of *Intruder Watch.*

On p 40 (*Spotlight of SWLing*) appears a trivial item, but its significance, out of all proportion to its impact, should not be missed. Since February 1944, the BBC has used *Liliburlero* (not Lily Bolero, Robin! She was one of the Spanish Boleros) as the news theme in the World Service. It was distinctive and recognisable — in fact, unique. Listeners around the world loved it.

The tune is as old as the hills and its deletion on the flimsy pretext that it has political connotations in Ulster is blatant censorship. Those "skeletons fighting the skeletons of the past" on both sides in Ulster have no relevance to the integrity of one of the longest-established and most impartial news services in the world.

What has *Liliburlero* to do with amateur radio? Simply this: the subversive media manipulators and social controllers who appear to be infiltrating the BBC also have their sights on the control of all forms of communication. Those "sealed rigs" and programmed QSOs may be closer than 2036.

Perhaps we should take another look at packet radio.

As someone said, the price of liberty is eternal vigilance.

Yours faithfully,

Peter Thomas VK5ZPT,
Thomas Hill Road,
McLaren Flat, SA. 5171.
ar

GEIGER COUNTER

In reply to the letter from VK6OF in July requesting information on a Geiger counter, I have written to the writer directly, but would address some comments to other readers also.

Unfortunately, this type of Geiger-Muller counter would not be able to detect, still less to quantify, the fallout from Chernobyl when it arrives. That will require sophisticated low-level counting tech-

niques; specifically, concentration (ashing of solids and evaporation or filtration of liquids) and counting in a lead castle with digital scalers. Even when a total count is obtained, interpretation of its biological significance will require gamma-spectrometry to determine the mix of isotopes represented.

Remember that Chernobyl, while very large for a peacetime accident, was small in comparison with the world's atmospheric weapons testing of the 1950s and early 60s, which required such techniques to trace the stratospheric trans-equatorial fallout. Even in Western Europe the tropospheric fallout would be hard to detect with an unshielded G-M counter of the sort that an amateur could build, or afford to buy.

73,

Jim Lloyd VK1JL,
18 Pera Place,
Red Hill, ACT. 2603.
ar

DISCUSSION PAPER

I would like to present my personal views to the Discussion Paper, February AR.

I agree that new members to the amateur radio fraternity could be attracted from the existing computer hobbyist groups, however, I do not support a reduction in licensing standards.

My suggestions for a Digital Licence (HF) would be:

Novice Level — as for the present novice regulations and CW, but for theory, delete questions on speech transmission and insert questions on digital transmissions. This would allow successful candidates to operate CW and Digital Transmissions in designated portions of the Novice Bands.

For a Digital Licence I would suggest:

Limited Level — as for the present limited regulations and theory, delete questions on speech transmission and insert questions on digital transmission. This would allow successful candidates to operate digital transmission in the designated portions of VHF and above.

Present holders of Novice licenses should be granted Digital Transmission privileges.

The present examination papers for Novice and Limited could be structured to allow for candidates to sit:

a) Novice
b) (HF) Digital
c) A combination of a) and b) and
d) (VHF) Digital

I look forward to reading further views on the Discussion Paper in AR.

73,

Rod Adams VK3CBO,
c/- Post Office,
Kiewa, Vic. 3691.
ar

DISCUSSION PAPER

I wish to comment on the recently published Linton/Harrison Paper on future trends, and also to present an alternative plan.

It seems to me that the idea of introducing a lower entry level than the present novice examination, to encourage operator only activities, is a serious mistake. The CB experience in the late-70s bears this out. As soon as the novelty of using their "radio-telephones" wore off, and in the absence of the knowledge to experiment, boredom led many to irresponsible on- air behaviour.

I feel a better idea would be to allow novices the use of the whole 10 metre and 70 cm bands, (where there is large bandwidth available) for the purpose of operating AM or CW equipment which they home-brew themselves. (No "black-boxes" to be allowed at all). Specialised segments in use for beacons, repeaters and amateur television, etc would have to be excluded, of course. The reason for suggesting AM instead of SSB or FM is to keep the price low, the equipment easy to build, and to ensure success in tuning and on-air operation.

A modified examination, to test their competence to build and operate such equipment would be required. Theoretical knowledge soon follows experience, thus encouraging attempts to pass the Limited/AOCP examinations (in its present form — including Morse code).

The novice five words-per-minute could also be retained.

I can imagine all the electronic magazines responding with constructional articles for AM-receivers and transmitters, and not only novices building them. Hence, home-brewing would foster the interchange of technical information between all three grades of licensees (on 70 cm), as well as encouraging the sort of experimentation which is rare these days. Both activities were the original reasons licenses were issued and surely would attract more people to the hobby.

There is a big resurgence of interest in the less complex world of the 1930 to 1950 era in cars, aircraft, model aircraft, etc, and that is also what this suggestion represents. Although regressing to an old-fashioned mode, novices would gain the thrill of using simple, cheap, home-built equipment, which they could repair or modify themselves.

That must be better than the present system, where many (most?) candidates give answers (learned "parrot fashion") to barely understood multi-choice theory questions, which are largely irrelevant to using the "black-box" transceiver, which they will inevitably be attracted to buy and use on air.

Regards,

Geoff Barron VK2AZT,
6 John Street,
Cootamundra, NSW. 2590.
ar

SPREAD THE WORD

On page 34 of AR July 1986, there is a heading *Spread the Word* asking for ideas to help other amateurs. I think this is an idea which could be enlarged even more.

As a recent devotee to the hobby (approximately six years), I find there are many things I require answers to which are not available in books at libraries, etc.

In this respect I wonder why AR has not devoted space to a section of our excellent magazine to a question and answer session.

As this would no doubt entail an extra duty to our overworked volunteer group in compiling AR the queries could be printed as for *Over to You* letters and readers invited to contact the questionnaire direct.

Just as a response to *Spread the Word* I needed to replace the ear pads on my headphones (the small ones) and found, on inquiring at the local foam material retailer, that the best way to cut foam is to use the household electric carving knife. It cuts foam very neatly and is a lot cheaper than purchasing them, particularly when they are not always obtainable (the ear pads, that is).

Two type of questions I would like to ask is:

What causes my power supply zener diode and fuse to blow out? It is regularly used to power a two metre 25 watt transceiver. The supply is rated for 6-8 amps.

Why is it necessary to have, in an ATU, a variable capacitor in series as well as in parallel?

These type of queries would be of interest to me as a newcomer to the radio hobby and maybe others as well.

Yours truly,

R Davey VK6ARD,
12 Lillian Street,
Cottesloe, WA. 6011.

Thank you for participating and contributing to AR, OM. As you will find elsewhere in this issue, beginning this month, a new column entitled Technical Mailbox. One of the Technical Editors felt there was a need for this type of column within the magazine and you have confirmed it. Your questions will be passed on to him for a reply next month.
ar

HOME BREW COST TO RISE

On July 1, a 20 percent sales tax on tube and hollow square- section aluminium came into force. Many of us use the former to make elements in home-brew antennas and a few use the latter for booms. However, the tax does not apply to extruded or drawn aluminium products in "T", "L" or squared "U" shapes.

Whoever devised the new impost must have had amateurs in mind!

Ken Gott VK3NJU,
38A Lansdowne Road,
St Kilda, Vic. 3183.
ar

QSP

CHIP DRAWS SINUSOIDAL LINE CURRENT

The TDA 4814 IC contains the circuitry for a switched mode power supply with sinusoidal line-current consumption. Sinusoidal line current is drawn from the supply network in particular when there is high power consumption.

One possible application is in electronic ballasts for fluorescent lamps, especially when a large number of these lamps are connected on one supply point.

This IC is additionally suitable for general driving of switched mode power supplies including energy supply, welding equipment, battery chargers and motor control.

The active harmonics filter consists of a rectifier arrangement in a bridge circuit followed by an up-converter.

Through a controller action it is possible to draw a virtually sinusoidal current from the single-phase line and produce a regulated DC voltage at the output.

In the case of an SMPS with conventional line rectification it is possible to achieve a power factor (ratio of active power to apparent power) of 0.5 to 0.7.

The active harmonics filter serves for improving the power factor which reaches a value of almost one, and for reducing the load on the line produced by the harmonics.

The losses caused by the active harmonics filter are more than compensated by the fact that a subsequent converter can constantly be operated at an optimal operating point because of the input control of the operating voltage.

The extra effort that is necessary, compared to an SMPS without an active harmonics filter, is made good upwards of about 500W by savings elsewhere; eg smaller smoothing capacitance and transistors of a higher resistance in the SMPS.

The IC is a standard 14 pin dual in line package.

From *Electronics News*, July 1986

DOLLARS AND dBs

How many times have you heard an amateur refer to something costing say *50 dB* when talking about some simple accessory?

Assuming that this particular *dB* is referenced to one dollar; ie *dB$*, it would appear that this purchase was on the order of $100 000! I do not know about other QTHs, but in Sydney this would buy a reasonable house! Perhaps there is some confusion in the amateur ranks as to exactly what the *dB$* refers to, so this little table should clear up the mystery somewhat.

COST	
$	dB$
1	0
5	7
10	10
15	12
20	13
30	15
40	16
50	17
100	20
200	23
500	27
1000	30
10 000	40
100 000	50

All calculations are rounded off to the nearest integer. Figures of *dB$* for values of $ that are not shown can easily be interpolated, or looked up in any table of logarithms.

So if you really mean *dB$* when you say *dB*, the above table will prove invaluable.

Contributed by David Horsfall VK2KFU

Silent Keys

It is with deep regret we record the passing of —

MR P BARLOW	VK5NPC
MR C M BAMPTON	VK2CMB
MR J HARGREAVES	VK2DUL
MR A L STEHN	VK4IS

Obituaries

JIM BOISSETT VK2ETU (VK2NBY)

Jim passed away on May 13, 1986.

Jim was known to many as *Radar,* possibly due to his training during WWII as a Radar Technician. This gave Jim a grounding in electronics.

He was a foundation member of the Western Suburbs Radio Club, and held the position of President for some time.

He will be sadly missed within the Club and by his many amateur friends.

Rex Morgan VK2PEX

PETER BARLOW VK5NPC

Amateurs and shortwave listeners around the world will be saddened to hear of the passing of Peter Barlow VK5NPC on June 26, 1986.

Peter was an optimistic character who revelled in new challenges to test his capabilities. For over a year now, Peter has been producing the WIA Sunday Morning Broadcasts in South Australia and as the 'front-man' for the WIA, he dedicated a lot of time each week to making sure that every program was a good one and he continued to exhort us at the end of each program by saying *what ever you do, be good at it* a creed by which Peter obviously lived his life. He rose to the very top management in his chosen field and was known throughout the business world as a great competitor. In fact, Peter had many competitors but no enemies.

He was known as a man of tact and diplomacy but also, he was never afraid to speak his mind when he felt it was needed. He had a youthful enthusiasm for life which belied his 66 years, but he was also available with encouragement and mature advice when needed. Peter was a man whose word could be trusted.

It was a great tribute to Peter, that at his funeral service the chapel was crowded with some 120 or so of his friends paying their last respects and of that crowd, at least 20 were amateurs.

I am sure that all members of the amateur fraternity will join me in extending our sincere sympathy to Peter's wife Joan, to their son Grant and to other members of his family, and I know, that many of you, like me, will always be proud and honoured to be known as a friend of Peter Barlow.

Chris Whitehorn VK5PN

CYRIL RENTON VK4CR

All who were fortunate to know Cyril were saddened to learn of his passing on June 22. Cyril was a quiet and gentle person and was highly respected by those who knew him.

He was a wonderful husband to Maynie, a devoted father to his three sons and one daughter, and a loving father-in-law, grandfather and great- grandfather.

Cyril entered the Queensland Railway Department as a fitter when a young man, but with his knowledge and capability, soon rose to be a principal designing engineer. He retired from the Railways in 1965. His hobby was amateur radio and fellow amateurs will recall his goodwill and gentlemanly manner. He will be missed by his many friends and particularly those whom he met on the amateur bands over many years.

Cyril was a life member of the Ipswich and District Radio Club.

He had that wonderful satisfaction that many would be proud of, in that two of his sons, Alan VK7RE and Peter VK4PV and his daughter-in-law, Anne VK4MUM, are amateurs that can carry on the great tradition of amateur radio.

Cyril and Maynie recently celebrated their Diamond Wedding — a most memorable and enjoyable occasion.

Deepest sympathy is extended to Cyril's family.

Norman Hart VK4KO

DON WILSON VK2AES

The strains of *The Teddy Bears' Picnic* heralded to many a pre-war medium-wave listener that another relaxing Sunday morning session of records from Teralba was about to begin.

The call of VK2AES, on SSB in recent years meant a chance for a pleasant QSO to local and DX calls alike. Both now are only memories as Don Wilson passed away on June 6, following a brief, but overwhelming illness that even his strong spirit could not overcome.

Born in 1913 in West Wallsend, one of a family of seven, Don Davidson Wilson was brought up in the staunch traditions of the coal mines, which gave the area its wealth and jobs. Like so many more young men of that era, he became a miner when he left school, but this career was shortened by an accident when, at 19 he lost a leg on the rope-way at the pit bottom.

It could have been this accident that spurred him on to study for a position away from the heavy manual work. So with radio in its infancy he took the challenge and made the grade. He soon gained technical qualifications which would assure him of stable employment.

Don married Lillian in 1935, and the couple settled in the then thriving mining village of Teralba. Their house in Blair Street was to be his home until his untimely death.

Don was licensed in 1936 as VK2AES, and he became interested in DX as well as local broadcasting.

His studies took him through to the Broadcast Operator's Licence in 1940. When his equipment was confiscated and his licence suspended because of the state of emergency declared shortly afterwards, Don was shocked. This was the turning point in his career and he did not become really active again until much later.

His radio and electrical business in nearby Boolaroo took up most of his time and he had been in the same shop for 34 years when he retired in 1977. Don was active in many local organisations. He held an executive position in the Boolaroo Bowling Club and he was a keen fisherman. The packed chapel at his funeral showed just how much he was respected in the local community.

Don is survived by his wife Lillian, and children Joan, Don, John and their families. As well, he leaves a big circle of radio amateur friends at Westlakes Club and worldwide. He will be sadly missed by all.

Keith Howard VK2AKX

CHANGE OF LANDMARK LOCATION

ACE Radio, who have traded in Victoria Road, Marrickville, since 1934, have been sold. The new owners re-located the business to Manly Vale in July.

TEGA ELECTRONICS

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RANDOM MORSE — COMMODORE 64

Many new computer owners may find it difficult to modify computer programs.

Neil Cornish VK2KCN
56 Sherwin Avenue, Castle Hill, NSW. 2154

John Wickham's Random Morse program for the Vic-20 computer (AR May 1986), was very good, however many new computer owners will find that it is not "easy to modify for other computers." Also, not being able to vary the speed of the CW will be a problem for those actually trying to use the program to "brush up on their CW." With this in mind, I offer this program written for the Commodore 64, which is similar in it's aims of generating Random Morse, but allows variations in the speed.

When RUN, the program randomly generates 250 characters which is the approximate length of the 10 WPM DOC test. For the novice test, which is about 125 characters, alter the 250 in line 270.

The 250 characters are split up into groups of from two to eight characters to better simulate actual words and this process takes some 15 seconds after which the operator is asked to input the speed in WPM. A default of 10 WPM may be selected by simply pressing ***RETURN***.

The computer then pauses until the operator is ready to receive the CW and while the CW is being sent, the screen blanks so that cheating is not possible. When sending is complete, the characters appear on the screen for checking.

This program is adapted from my full Morse Trainer Program which was published in *Amateur Radio* in September 1985. This program features sending and receiving of plain text, random characters, variable spacing, etc.

ar

```
100 REM RANDOM MORSE 64, NEIL CORNISH VK2KCN
110 DIMA$(36),B$(36),C$(100),D$(100)
120 A$="0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ"
130 DATA33333,13333,11333,11133,11113
140 DATA11111,31111,33111,33311,33331
150 DATA13,3111,3131,311,1,1131,331,1111
160 DATA11,1333,313,1311,33,31,333,1331,3313
170 DATA313,111,3,113,1113,133,3113,3133,3113
180 FORT=1TO36:A$(T)=MID$(A$,T,1)
190 READB$(T):NEXTT
200 PRINT"INITIALISING"
210 Q=INT(RND(0)*6)+2
220 FORT=1TOQ
230 L=INT(RND(0)*36)+1:A=A+1
240 C$(C)=C$(C)+A$(L)
250 D$(C)=D$(C)+B$(L)+"2"
260 NEXTT:C=C+1
270 IFA<250THEN210
280 INPUT"SPEED WPM    10■■■■";P:P=500/P
290 PRINT"PRESS [SHIFT] FOR CW !":WAIT653,1
300 POKE53265,PEEK(53265)AND239
310 PRINT"■":FORT=1TOC:PRINTC$(T);:NEXTT
320 GOSUB340:POKE53265,PEEK(53265)OR16
330 FORT=STOS+24:POKET,0:NEXTT:END
340 GOSUB430:FORX=1TOC
350 FORY=1TOLEN(D$(X))
360 R=P*VAL(MID$(D$(X),Y,1)):IFR=2*PTHEN500
370 GOSUB470
380 FORZ=1TOP:NEXTZ
390 NEXTY
400 FORZ=1TO7*P:NEXTZ
410 NEXTX
420 RETURN
430 S=54272
440 POKES+5,0:POKES+6,240:POKES+1,47
450 POKES,100:POKES+3,8:POKES+2,0
460 POKES+21,200:POKES+22,50:RETURN
470 POKES+4,65:POKES+24,47
480 FORT=1TOR:NEXTT
490 POKES+4,64:RETURN
500 FORZ=1TOR:NEXTZ:GOTO390
READY.
```


WILLIS

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Tinned Copper Wire on Polystyrene Supports

TYPE	DIAM	LENGTH	TPI	IND uH	SWG	PRICE
1-08	½"	3"	8	2.00	19	$2.12
1-16	½"	3"	16	5.50	21	$2.12
2-08	⅝"	3"	8	2.70	19	$2.50
2-16	⅝"	3"	16	8.00	21	$2.50
3-08	¾"	3"	8	2.90	19	$3.05
3-16	¾"	3"	16	10.90	21	$3.05
4-08	1"	3"	8	4.80	19	$3.38
4-16	1"	3"	16	19.90	21	$3.38
5-08	1¼"	4"	8	9.40	18	$3.74
5-16	1¼"	4"	16	37.50	21	$3.74
8-04/4	2"	4"	8	—	18	$5.45
8-10/4	2"	4"	10	32.25	18	$5.45
8-12/4	2"	4"	12	—	19	$5.95
8-16/4	2"	4"	16	83.50	19	$5.95
8-08/7	2"	7"	8	—	18	$9.45
8-10/7	2"	7"	10	60.80	18	$9.45
8-12/7	2"	7"	12	—	19	$9.95
8-16/7	2"	7"	16	157.75	19	$9.95

WILLIS Air-Wound Inductances are a high quality product manufactured to the requirements of professionals in the electronic field.

The coils listed above are classed as *'Bulk Inductance'* and are intended to be pruned for individual requirements. Complete coils can be used of course, if the total inductance is the value required.

The inductance values shown are approximate allowing for any variations in wire gauge and other small manufacturing variables.

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Solar Geophysical Summary — MAY

Solar activity was low in May, except on the fourth, when there was a single M-class flare around 0939 UTC. During the second half of the month, a region on the sun appeared likely to produce energetic flares, but none eventuated. The growth of this region was associated with a rise in the 10 cm flux value which peaked at 79 on the 25th. The region soon decayed and the flux returned to low levels. The monthly flux average was the lowest since September 1985.

The 10 cm readings for the month were:
1=71, 2,3=73, 4,5=70, 6,7=69, 8=68, 9=69, 10,11=70, 12=69, 13,14=70, 15=71, 16=73, 17=74, 18,19=77, 20=78, 21-23=77, 24=78, 25=79, 26=75, 27=73, 28,29=72, 30,31=71. Average was 72.7 and the Sunspot Average was 13.1.

The running yearly average was 17.0 at November 1985.

Sunspot averages over the past 12 months were:
5/85=27.4, 6/85=24.2, 7/85=30.8, 8/85=10.4, 9/85=3.9, 10/85=18.5, 11/85=16.6, 12/85=17.2, 1/86=23, 2/86=23.6, 3/86=15.7, 4/86=20.4, 5/86=13.1; with the yearly average being 5/85=17.8, 6/85=17.5, 7/85=16.9, 8/85=16.6, 9/85=17.1, 10/85=17.4, 11/85=17.0.

GEOMAGNETIC

May was another quiet month with the exception of the extended disturbance at the start of the month. The first part of this disturbance appears to have been associated with the disappearance of a solar filament several days earlier — the second part was associated with the passage over the solar disk of a coronal hole.

May 2-7

The geomagnetic field became disturbed at around 1000 UTC on the second and was at storm levels until 0900 UTC on the third. Following a period of unsettled to active conditions on the fourth and fifth, the field again reached storm levels after 0600 UTC on the sixth. This disturbance lasted until 0800 UTC on the seventh after which the field was generally unsettled.
A=29, 40, 18, 16, 39, 14.

May 31

The field was at storm levels with periods of minor storm conditions.
A=18.

From data supplied by the Department of Science, IPS Radio and Space Services — May 1986.

ar

QSP

SOMETHING FOR THOSE WHO HOMEBREW & DO NOT HOMEBREW

This is not a contradiction in terms, or a *Clayton's joke*. This article is for those who homebrew (build or experiment) and do not homebrew (make their own moonshine.

According to the May 1986 edition of *Elements* some 75 to 80 percent of up-market Australian wines use a foil wine cap consisting of tin and lead (just like solder — now you can start to see the association). The ingots of lead alloy are placed, like a thick sandwich or pastry, between two strips of tin and rolled together under pressure.

Because of the qualities of both metals, this is enough to form a strong and lasting bond.

Now that you are pointed in the right direction, it is up to some enterprising amateur (who can convince his YF/YL that large purchases of wine are required for his radio experiments) to find a way of using old wine caps as a solder substitute!

Good Luck!

DEADLINE

All copy for inclusion in the November 1986 issue of Amateur Radio, including regular columns and Hamads, must arrive at PO Box 300, Caulfield South, Vic. 3162, at the latest, by 9am, 22nd September 1986.

Hamads

PLEASE NOTE: *If you are advertising items FOR SALE and WANTED please write* ***each on a separate sheet of paper,*** *and include all details; eg Name, Address, Telephone Number, on both sheets. Please write copy for your Hamad as clearly as possible. Please do not use scraps of paper.*

* Please remember your STD code with telephone numbers
* Eight lines free to all WIA members. $9.00 per 10 words minimum for non- members
* Copy in typescript, or block letters — double-spaced to **Box 300, Caulfield South, Vic. 3162**
* Repeats may be charged at full rates
* QTHR means address is correct as set out in the WIA current Call Book

Ordinary Hamads submitted from members who are deemed to be in the general electronics retail and wholesale distributive trades should be certified as referring only to private articles not being resold for merchandising purposes.

Conditions for commercial advertising are as follows:

$22.50 for four lines, plus $2.00 per line (or part thereof)

Minimum charge — $22.50 pre-payable

Copy is required by the Deadline as indicated below the indexes on page 1 of each issue.

TRADE ADS

AMIDON FERROMAGNETIC CORES: Large range for all receiver & Transmitting Applications. For data & price list send 105x 220mm SASE to: **RJ & US IMPORTS,** Box 157, Mortdale, NSW. 2223. (No inquiries at office . . . 11 Macken Street, Oakley). Agencies at: Geoff Wood Electronics, Lane Cove, NSW. Truscott Electronics, Croydon, Vic. Willis Trading Co, Perth, WA. Electronic Components, Fishwick, Plaza. ACT.

WANTED — ACT

MONOBANDER YAGI: or tribander Yagi for 20 metres. Keith VK1KG. Ph:(062) 31 7438.

WANTED — NSW

ICOM 720A, 730, 735, 740, 745 HF TCVR: & power supply. Prices to Ph:(049) 77 1507 evenings.

TRIBANDER HY-GAIN TH5, 6: TET HB34D or similar. Paul VK2AUL. Ph:(02) 528 9490.

YAESU SYNTHESISED SCANNING EXTERNAL VFO: FV-901 DM with all cables & manual to integrate with Yaesu FT-901D. Mint to very fine condition. John VK2AEW, QTHR.

WANTED — VIC

CIRCUIT DIAGRAM: for 10 & 15 metre preamp for use with Icom 720A. Will pay costs, reverse charge call. Ash VK3NAB. Ph:(051) 22 1903.

HELP WANTED: to align VZ200 RTTY de-coder. Equipment required. Frequency counter, audio generator, & CRO. Dave L30546. Ph:(03) 688 5852 BH or (03) 232 7492 AH.

MOBILE MOUNTING BRACKET: for Icom 22S. Len VK3DCF, QTHR. Ph:(060) 71 0275 after 7 pm.

VALVE: 4/250, 4/400 or QB3.5/750 or similar. VK2BGZ, QTHR. Ph:(02) 559 5508.

YAESU POWER SUPPLY: type FP107E, complete with instruction book. Yaesu tcvr, type FT101-FT101E or FT101EE. VK3LS, QTHR. Ph:(03) 379 3619.

WANTED — QLD

KENWOOD TS-520S: in mint condition. Also 6HG8 valve. VK4WR, QTHR. Ph:(071) 41 1315.

WANTED — SA

YAESU FC-301 ATU: to match FT-301 & FP-301. Terry VK5ACB, Box 364, Bordertown, SA. 5268. Ph:(087) 52 2714.

WANTED — TAS

YAESU SP-980 SPEAKERS: two required. Also FT1 tcvr & ATU FC901/902 coupler. VK7AN. Ph:(003) 31 7914.

EXCHANGE — SA

DIAWA CNW 417 ANTENNA TUNER: 1.9-28 MHz. Cross needles for Yaesu FC700 tuner with 8V hook up. Charlie VK5YC. Ph:(085) 258 0320.

FOR SALE — ACT

TWO-ELEMENT TRIBANDER QUAD: cast alum hub, boomless fibreglass spreaders. $120 ONO. Keith VK1KG. Ph:(062) 31 7438.

FOR SALE — NSW

DECEASED ESTATES: see VK2 Mini Bulletin Notes. The following estate items are being offered and interested parties are invited to submit written tenders to the Divisional Council, PO Box 1066, Parramatta, NSW. 2150. Closing date — September 11, 1986. GROUP A: 1 AT-230 antenna tuner. 2 TS-180S with MC-50 mic. 3 FRG-7000. 4 PS-30; SP-180 (speaker). 5 DM-81 grid dipper. 6 AVO-8 multimeter. 7 RD-300 dummy load. GROUP B: 1 TS-520 SE with mic, earphones, key. 2 Vertical multiband antenna, installed on roof, requires removal. The items being offered are located in Sydney. Submission to indicate item and price offered in each case. The usual tender terms apply. Endorse envelope "TENDERS." Separate submission for each group, but can be included in same envelope.

SWAN LINEAR AMPLIFIER: model 1500Z. Good condition. $550. VK2VF, QTHR. Ph:(02) 449 4950.

TELLUROMETER: with 2.3 GHz FM link. Tripods, dishes, qty 3. $150. Video tape .5" x 7" spools. New $5. Crystal set crystal holders, old open type. $3.50 posted. VK2ZQC, QTHR. Ph:(02) 81 2143.

TOWER: 13m, 3 section triangular free standing (some welding needed) $100. 19m, 3 section mast, winchable (no winch included) with mount drilled & ready for KR2000RC & stay bearing. $120. KR200RC. Never used, still in box, new. With 32m of 8-core control cable $650. Or the lot for $770. VK2QY. Ph:(046) 33 8175.

VALVES: large variety including QQEO6/40, QQEO3/12, QQEO3/10, 6AM5, 6AM6, etc. Radio vibrators (V6606, AV124). 2 X VHF 50W STC base stations & associated equip. Any reasonable offers accepted. G Hayden, 25 Commissioner Street, Cooma, NSW. 2630. Ph:(0648) 2 1627.

VALVES: QQEO6/40 8 off, QQEO3/20 1 off. Some unused $3 each. 1 base and 6 plate connectors for same $5. VK2BGZ, QTHR. Ph:(02) 559 5508.

YAESU FT101E HF TCVR: good condition with mic, manual. $400. Trio 9R-59DS rx with manual $100. Bob VK2VMX, QTHR. Ph:(063) 51 4217.

FOR SALE — VIC

AWA 12" PORTABLE B&W TV RX: type P. $30. AWA car phone tcvr — suitable for 2 metres. Complete with manual. $30. VK3LS, QTHR. Ph:(03) 379 3619.

DRAKE 2-B RX: Q-multiplier, speaker, monitor CRO, spare valves, crystals, handbooks. $230. Full details VK3IQ. Ph:(03) 306 4040 AH.

ESTATE OF LATE VK3GY: FT227RA 2m trx fm scanning unit. $220. FL2050 2m linear amp. $200. Home-brew PS 13.6V x 10 amp reg & over- voltage cutout. $20 (or $400 the lot). FP700 power supply & speaker. New, unused. (13.6V @ 20 amps). $400 ONO. Diawa ant tuning unit, type CNW-418. $150. Fujiden lo-pass filter. 50 ohm-32 MHz. Model FD-30M. $15. Micronta SWR/PWR/FS meter. 3-30 MHz -1kW. New unused. $25. Heathkit rx, model GR78. 0.2-30 MHz -6 bands w/- bandspread. $120. 12V operated. (no batteries). W/construction manual. Valve types 803, 811, 813, 866 (2), 5R4 (2), 6DQ6 new. Best offers. Condensers 440 pF x 3 gang - 5. 440 pF x 2 gang — 4. (Suitable for ATU pi-couplers) offers. Condensers 360 pF transmitting double spaced (ex AT5 TX - 2. $10 each. 80 pF transmitting double spaced made by Transmission Equipment - 2 $5 each. For inquiries contact Ed Manifold VK3EM, QTHR. Ph:(03) 578 7745.

FT-7: 80-10m tcvr as new condition. Professionally fitted with several extras. Complete with mobile mount, mic, handbook. $375. 9.0 MHz, 2.1 kHz bandwidth, superior quality, Fox Tango Club, 8 pole, xtal filter. $65. VK3ARZ, QTHR. Ph:(03) 584 9512.

HEWLETT-PACKARD 41C: w/owners handbook. $200. 41C/41CV card reader $100. Printer w/transformer $175. Wand $75. HP-IL module $100. Memory module, quad memory module $60 ea. Time module $100. Circuit analysis, math & statistics pacs $30 ea. Relevant books & solutions $10. All perf cond. HP-15C scientific calculator w/advanced functions & owners handbooks, new. $130. HP-34C w/transformer, owners handbook & programming guide, student engineering, app maths, statistics, solving problems $200. Perfect condition. Estate Alex VK3AAP. Mona VK3BRE. Ph:(055) 62 6016.

HIDAKA 3 EL TRIBAND BEAM: with balun, new unused in original packing $200. National (USA) NCX5 200W 5 band tcvr. Solid state VFO dig-readout, PS. Manual spare valves, ex cond. $120. KW (UK) Viceroy 200 W 5 band tx. Vy stable VFO, PS, manual, spare valves. Ex cond $75. All ONO. Prefer buyer inspect & collect. Chas VK3PT, QTHR. Ph:(059) 75 2775.

PANASONIC OSCILLOSCOPE: model VP-516A. 8 cm by 10 cm screen. Y-axis, 30 mV/cm to 30 V.cm, DC to 3 MHz (-3dB), 5 MHz (-6 dB), 0.18 usec risetime. X-axis, 0.2 usec/cm to 1 sec.cm sweep, auto-trigger, internal or external. External X-axis input, DC to 300 kHz (-3 dB), sensitivity 1V p- p. Hybrid circuit, spare valves supplied. Power 240V AC, 30W. Weight 6.5 kg. Manual with circuit, operators guide & maintenance details supplied. Clean & in good working order. Two available. $125 each. Ron VK3AFW, QTHR. Ph:(03) 579 5600.

VALVES: 250 new miniature 7 & 9 pin. Many types including 10 7360. $250 the lot. VK3VF, QTHR. Ph:(059) 75 1475.

YAESU FRG7700 RX: with antenna tuner. $495. Or exchange for 2 metre hand-held. VK3RM, c/- Eliza Lodge, 347 Nepean Highway, Frankston, Vic. 3199.

FOR SALE — QLD

KENWOOD TS-520: DG5 mic & manuals. Good working order. $400 ONO. Fred VK4NMA/L40855, QTHR. Ph:(07) 396 3521.

MICROWAVE MODULES: 70 cm amplifier with circuit. $240. Kevin. Ph:(07) 377 4286 BH or (07) 201 3006 AH.

FOR SALE — SA

TS830S HF TCVR: with WARC bands & DC converter. In good condition with original packing & manuals. $850 ONO. Graham VK5YM, QTHR. Ph:(087) 25 9752.

FOR SALE — WA

KENWOOD TS120; AT120; VFO120; MB100; MC35: owners handbook & service manual for all. Orig cartons, used sparingly, mint condition. $650 complete. Century 21 rx, 0-30 MHz, solid state. Analog dial with handbook. $150. Dunkley Graham VK6AMG, QTHR. Ph:(02) 542 3208 during September only. After September phone (095) 35 2490.

FOR SALE — TAS

YAESU FT102: 230W output PEP, inc AM/FM board. Filter, narrow SSB, CW filters. New in box. Must sell. $1130 the lot. Cost $1600. VK7AN, QTHR. Ph:(003) 31 7914.

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KENWOOD

...pacesetter in Amateur radio

NEW Compact 45 W 2 m

45 Affordable Watts!

TM-201B/401B

Super-compact mobile transceivers

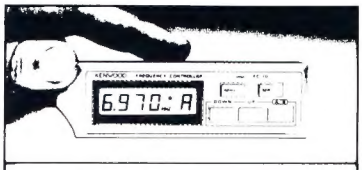
The TM-201B boasts a powerful 45 watts output, easy-to-operate front panel controls, and ultra-compact size. The GaAsFET receiver front end provides high sensitivity and wide dynamic range. Receive and transmit characteristics are tailored for minimum distortion and excellent audio quality. Both the TM-201B and the TM-401B are supplied with a high-quality external speaker, hand microphone and mounting bracket.

- 45 watt output, with HI/LO power switch (TM-401B has 25 watts output.) 5 W low.
- Dual digital VFOs
- TM-201B covers 144-148 MHz. TM-401B covers 440-450 MHz
- 5 memories plus "COM" channel, with lithium battery back-up

- Programmable, multi-function scanning
- High quality external speaker supplied
- Audible beeper confirms operation

Optional accessories:

- PS-430 power supply
- TU-3 or TU-3A two frequency tone encoder
- FC-10 frequency controller
- MC-55 (8-pin) mobile microphone
- SP-40 compact mobile speaker
- SP-50 deluxe mobile speaker
- SW-100A/B SWR/power meters
- SW-200A/B SWR/power meters
- SWT-1 2 m antenna tuner
- SWT-2 70 cm antenna tuner
- PG-2K extra DC cable
- PG-3A DC line noise filter
- MB-201 extra mobile bracket



Optional FC-10 frequency controller

Convenient control keys for frequency UP/DOWN, MHz shift, VFO A/B, and MR (memory recall or change memory channel).

More information on the TM-201B/401B is available from authorized dealers.

TM-401B is similar to the TM-201B but covers 440-450 MHz and is 25 watts. Specifications and prices subject to change without notice or obligation.

KENWOOD ELECTRONICS AUSTRALIA PTY. LTD.

4E WOODCOCK PLACE, LANE COVE, SYDNEY, N.S.W. 2066. Ph. (02) 428 1455.

Further, beware of dealers not listed in this advertisement who are selling Kenwood communications equipment. All Kenwood products offered by them are not supplied by Kenwood Electronics Australia Pty. Ltd. and have no guarantee applicable.

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MITCHELL RADIO CO. - 59 ALBION ROAD, ALBION (07) 57 6830

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INTERNATIONAL COMMUNICATIONS SYSTEMS PTY. LTD. - 8 NILE STREET, PORT ADELAIDE (08) 47 3688

W.A.:
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TRI-SALES - CNR NEWCASTLE & CHARLES STREETS, PERTH (09) 328 4160
WILLIS ELECTRONICS - 165 ALBANY HIGHWAY, VICTORIA PARK (09) 470 1118
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FORD ELECTRONICS - 209 HANCOCK STREET, DOUBLE VIEW (09) 446 4745

Yen Busters!

As this issue went to press, the poor old Aussie dollar reached an all-time low. Less than 60¢ US — and worse for amateurs — less than 90 Yen.

DSE puts value back into your dollar... look at these prices. They'll never be this low again — so if you want the latest in amateur bargains, buy now and $ave

Was $489

90 OFF 70!

Save on the FT703 hand-held: everything you need is in your hands for full 430-440MHz coverage. Thumbwheel frequency selection, repeater splits, high/low power operation — and all this in a hand-held that's just 65 x 34 x 153mm. Even has full VOX with optional YH2 Headset Mic! Complete with FNB-3 battery — and this crazy price is even $100 less than the current catalog price! Cat D-3508

$399 Save $90

SB-2 PTT Switch

Use in conjunction with 703 for ptt or lock-on transmit. Cat D-3512

YH-2 HEADSET

Full VOX operation with FT203 or use with SB-2 PTT. Cat C-4200

Only $35.95

Only $49.95

FT726 TRIBANDER:

What a bargain!

Was $2120

$1799

Your very last chance to grab one of these beauties — at such a huge saving over current retail! With a fantastic reputation for solid satellite work, the 726 offers features far and away the state-of-the-art in VHF/UHF technology:

- **All modes, all three bands with 6 & 70cm modules installed.**
- **Full duplex crossbanding with satellite unit installed.**
- **240V AC operated; 12V DC with optional power cable.**

Supplied with 2 metre module installed: add the extra bands when you need them! Cat D-2950

Save $321

SAVE 9000 YEN ON THE FROG!

Only $969

$100 Off!

Yaesu's superb FRG-8800: the receiver for the professional monitor, the avid SWL, or the amateur who wants real receiving power! Full 2MHz to 30MHz coverage PLUS VHF with the optional 118-174MHz converter (fully internal!) 10 memories, dual clocks... the features are endless. It's real value at this sensational saving! Cat D-2821

DC Cable:

Mobile or field operation — adapts the FGR8800 to 12V. Cat D-2822 $7.95

VHF Converter

Fully internal converter for the FRG8800. Cat D-2833

Only $65

ALL MODE ALL SAVING FT290R

$100 Off!

The versatile FT290: all mode 2 metre transceiver that goes anywhere: It's a portable (battery operated). It's a mobile (12V DC). It's a base (mains adaptor optional). It's superb!

- **Full 144-148MHz coverage**
- **FM, CW & SSB**
- **High/Low power outputs**
- **10 memories**

Cat D-2885

Was $689 **$589**

QUICK! Charge in and save!

Yaesu NC-15 Quick Charger — suits FNB3 and FNB4 NiCads. 2 hour charger, auto cut-out: and it's also a base supply. Handy — and a handy saving! Cat D-3513

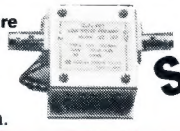
$145

Corona GaAsFET Preamps: Ideal for satellite reception!

- gain 20dB typical
- noise gain 0.8dB typical

Your choice of 2 or 70 preamps — with the performance that only GaAsFETS can give. And look at the savings!

Two Metre Cat D-2956 $79



Save $36

70 Centimetre Cat D-2955 $69

Save $20

ADVERTISING NEW OVERSEAS MODELS

Beware of adverts showing or offering new models from Japan. While some of these are available on the Japanese domestic market (ie not suitable for Australia) they are not yet available in Australia.

DICK SMITH ELECTRONICS PTY LTD

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